

Beyond Waste Consultant Team Issue Paper #5
March 21, 2003

Expanding Green Building Practices

in Washington State

Prepared for:
Washington State Department of Ecology

Under Contract to:



and

ROSS & ASSOCIATES
ENVIRONMENTAL CONSULTING, LTD.

Contract #C0200264



WASHINGTON STATE
DEPARTMENT OF
E C O L O G Y

Publication Number 03-04-032

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Executive Summary

This paper presents recommendations for ways that Washington State can foster increased adoption of green building practices regionally and nationally. To support development of its Beyond Waste Plan, the Washington State Department of Ecology has been researching ways to dramatically shift the State's current approach to waste and materials management. The State's vision is that the elimination of wastes will contribute to social, economic, and environmental vitality. This paper supports this vision by identifying barriers to expanding green building practices, exploring a menu of policy options, and recommending future actions the State would need to take to make green building mainstream in Washington.

The United States Green Building Council (USGBC) defines green design as follows:

Design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants in five broad areas:

- Sustainable site planning
- Safeguarding water and water efficiency
- Energy efficiency and renewable energy
- Conservation of materials and resources
- Indoor air quality¹

For the purposes of this paper, the consultant team has used this definition as the definition of green building. Because green building practices include reducing waste, using less toxic or recycled-content building materials, and recycling of construction and demolition debris, green building can be an excellent tool for achieving the Beyond Waste vision.

In essence, achieving the Beyond Waste Vision for green building will involve a fundamental transformation of the building industry such that green building practices and materials are used as a matter of course, and all new and renovated buildings are living buildings. This vision corresponds to the goals embedded in the three questions that guide this paper:

- What is needed to make green building mainstream in Washington?
- What is necessary to achieve maximum reuse and recycling of construction and demolition materials?
- What is required to transform design of buildings and materials to fully achieve the Beyond Waste Vision?

These three questions illustrate that achieving the Beyond Waste Vision for green building involves three essential transformations:

The State's Beyond Waste vision:

"We can transition to a society that views waste as inefficient uses of resources and believes that most wastes can be eliminated. Eliminating wastes will contribute to social, economic, and environmental vitality."

¹ http://www.usgbc.org/Docs/usgbc_intro.ppt

1. **Green building practices must become the standard, not the exception.** These practices must be as commonplace as safety measures, and taught to architects, contractors, engineers, and others as the logical, normal way to build a building.
2. **Construction and demolition debris must be reduced, reused, and recycled to the extent possible.** Achieving this transformation will require the infrastructure and markets to support recycling and reuse of debris to be in place and thriving. In particular, a deconstruction industry must arise and thrive in Washington State, and processing and handling capacity must be great enough to handle the amount of debris generated.
3. **Buildings and materials must be designed to benefit the environment, society, and the economy.** This major transformation is an umbrella for a host of critical changes. Buildings must become living buildings, generating no waste and actually contributing to rather than taking from the environment and society. Toxic components must be phased out of building materials or recaptured for recycling, raw materials must be harvested sustainably, and materials must be designed to stay in the organic or technical nutrient² cycles. Staying in one cycle or the other allows these materials to be reused and recycled easily and efficiently.

This paper examines the barriers to achieving each of these goals, and discusses the steps that the State could take to make these goals a reality. To develop this issue paper, the consultant team interviewed thirty green building experts, including state and local government representatives, developers, architects, contractors, and members of the waste management industry. We also performed extensive online research. Armed with this information, we analyzed the construction industry and the tools available to help foster the spread of green building practices in Washington State.

The ultimate result of this analysis is an Action Plan that the State can use to help reduce waste, eliminate toxic building materials, and encourage the use of green building practices, materials, and technologies in Washington State. The Action Plan outlines actions that the State can undertake immediately (within the next three years), in the near-term (within three to ten years), and over the long term (ten to thirty years). These actions are organized into four categories: making green building practices mainstream, achieving maximum reuse and recycling, transforming the building industry, and evaluating results. The table below summarizes this Action Plan.

² Technical nutrients are materials such as glass, metal, or plastic that remain in a closed-loop cycle of manufacturing, reuse, and recovery, and retain their value through many product cycles.

Table ES-1. Summary of Green Building Action Plan

	Immediate Actions	Near-Term Actions	Long-Term Actions
Make Green Building Practices Mainstream	<ul style="list-style-type: none"> • Adopt LEED™ standards for all State buildings • Create a State-wide Built Green™ program • Market green building programs • Ensure State procurement guidelines require the purchase of green building materials 	<ul style="list-style-type: none"> • Adopt LEED™ standards for all state renovation projects. • Attract investment in green buildings through a tax credit program. • Work with the building industry and permitting agencies to identify ways to streamline the permitting process for green buildings. • Remove regulatory barriers and disincentives to green building. • Continue to market Built Green™ and LEED™ programs. 	<ul style="list-style-type: none"> • Work with the USGBC to ensure that LEED™ standards continue to accommodate and incorporate new technologies and practices. • Embed green building practices in the State Building Code. • Work with state universities to ensure green building practices are taught in architectural programs. • Continue to market green building programs.
Achieve Maximum Reuse and Recycling	<ul style="list-style-type: none"> • Foster the deconstruction industry • Work with local governments to plan for providing adequate capacity to handle reuse and recycling of construction and demolition debris. • Work with the recycling industry to begin to develop processing capacity in eastern Washington. • Promote increased reuse and recycling of construction and demolition debris among contractors. 	<ul style="list-style-type: none"> • Attract investment in processing facilities in eastern Washington. • Foster expansion of debris handling capability. • Phase out disposal of construction and demolition debris in MSW landfills. • Work with local governments to improve reuse and recycling opportunities through the solid waste comprehensive planning process. • Continue to foster the deconstruction industry. 	<ul style="list-style-type: none"> • Fill infrastructure gaps. • At the national level, support development of new technologies to improve reuse and recycling. •

<p>Transform Design of Buildings and Materials</p>	<ul style="list-style-type: none"> • Begin working with national partners to develop criteria for determining whether a building material is green. • Support the Washington State Department of Natural Resources as it moves toward certification of state forests. 	<ul style="list-style-type: none"> • Persuade the USGBC to expand LEED™ so that it addresses toxic building materials. • Begin working with national partners on a product stewardship program for building materials. • Work with national partners to provide testing of green building materials. • Work with national partners to encourage manufacturing of building materials that stay within the organics or technical nutrient cycles. • Educate architects and contractors about green building materials. • Educate architects about designing buildings for less waste and for deconstruction. • Work with owners of private timberlands to increase the percentage of sustainably managed forests in Washington State. 	<ul style="list-style-type: none"> • At the national level, support development of new green building practices and new technologies that allow creation of green building materials. • Continue testing of green building materials if necessary. • Continue educating architects and contractors about new practices and materials.
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<p>Evaluate</p>	<ul style="list-style-type: none"> • Establish a baseline. • Assess the extent to which LEED™ and Built Green™ standards are helping Washington move toward the Beyond Waste Vision. 	<ul style="list-style-type: none"> • Use indicators to measure progress toward the Beyond Waste goal. • Evaluate whether LEED™ and Built Green™ programs continue to meet Washington's needs. • Ensure State procurement standards keep up with new materials & technologies. 	<ul style="list-style-type: none"> • Measure progress toward the Beyond Waste goal.
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1. Introduction

This paper presents recommendations for ways that Washington State can foster increased adoption of green building practices regionally and nationally. To support development of its Beyond Waste Plan, the Washington State Department of Ecology (Ecology) has been researching ways to dramatically shift the State's current approach to waste and materials management. The State's vision states that the elimination of wastes will contribute to social, economic, and environmental vitality. This paper supports this vision by identifying barriers to expanding green building practices and recommending future actions the State would need to take to make green building mainstream in Washington.

The United States Green Building Council (USGBC) defines green design as follows:

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- Sustainable site planning
- Safeguarding water and water efficiency
- Energy efficiency and renewable energy
- Conservation of materials and resources
- Indoor air quality³

For the purposes of this paper, the consultant team has used this definition as the definition of green building. Because green building practices include reducing waste, using less toxic or recycled-content building materials, and recycling of construction and demolition debris, green building can be an excellent tool for achieving the Beyond Waste Vision. Construction and demolition activities generate tremendous amounts of waste annually. In Washington, at least 2.6 million tons of C&D waste were generated in 2000, not including C&D wastes disposed of at municipal solid waste landfills that do not track C&D waste separately.⁴

Green building, however, goes beyond waste and materials use to address land, water, air, and energy issues, all of which are within the State's purview. Perhaps most importantly, green building is also a grassroots movement that has arisen on its own within the building industry, and has its own momentum, key players, issues, and triumphs. As such, it is larger than the Beyond Waste planning process.

In essence, achieving the Beyond Waste Vision for green building will involve a fundamental transformation of the building industry such that green building practices and materials are used as a matter of course, and all new and renovated buildings are living buildings. This vision corresponds to the goals embedded in the three questions that guide this paper:

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³ http://www.usgbc.org/Docs/usgbc_intro.ppt

⁴ Based on reported disposal of inert, demolition, and wood waste and C&D waste diversion in 2000, from Department of The State, Solid Waste and Financial Assistance, 2001, "Solid Waste in Washington State, Tenth Annual Status Report."

- What is needed to make green building mainstream in Washington?
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These three questions illustrate that achieving the Beyond Waste Vision for green building involves three essential transformations:

1. **Green building practices must become the standard, not the exception.** These practices must be as commonplace as safety measures, and taught to architects, contractors, engineers, and others as the logical, normal way to build a building.
2. **Construction and demolition debris must be reduced, reused, and recycled to the extent possible.** Achieving this transformation will require the infrastructure and markets to support recycling and reuse of debris to be in place and thriving. In particular, a deconstruction industry must arise and thrive in Washington State, and processing and handling capacity must be great enough to handle the amount of debris generated.
3. **Buildings and materials must be designed to benefit the environment, society, and the economy.** This major transformation is an umbrella for a host of critical changes. Buildings must become living buildings, generating no waste and actually contributing to rather than taking from the environment and society. Toxic components must be phased out of building materials or recaptured for recycling, raw materials must be harvested sustainably, and materials must be designed to stay in the organic or technical nutrient⁵ cycles. Staying in one cycle or the other allows these materials to be reused and recycled easily and efficiently.

This paper examines the barriers to achieving each of these goals, and discusses the steps that the State could take to make these goals a reality.

Throughout this paper, we refer to the State as the implementer of actions. It is important to note here that while the Beyond Waste Vision is a State product, the State's role in implementing the vision will range from direct leadership on some actions to forming partnerships to achieve others, and to encouraging other entities toward still others.

⁵ Technical nutrients are materials such as glass, metal, or plastic that remain in a closed-loop cycle of manufacturing, reuse, and recovery, and retain their value through many product cycles.

What's a Living Building?

The Earth Pledge Foundation's *Sustainable Architecture White Papers* series defines living buildings as those that follow the seven principles below:

1. Harvest all water and energy needs on site.
2. Be adapted specifically to site and climate and evolve as conditions change.
3. Operate pollution-free and generate no wastes that aren't useful for some other process in the building or immediate environment.
4. Promote the health and well being of all inhabitants, as a healthy ecosystem does.
5. Be comprised of integrated systems that maximize efficiency and comfort.
6. Improve the health and diversity of the local ecosystem rather than degrade it.
7. Be beautiful and inspire us to dream.

Source:

<http://www.care2.com/channels/solutions/buildings/354>

It is also important to note that a wide variety of players will need to take aggressive action to achieve the Beyond Waste Vision. The examples below are merely a sample of the actors whose participation will be necessary to achieve the Vision:

- Building industry groups, such as the American Institute of Architects or the National Association of Home Builders
- Green-building groups such as the US Green Building Council or the Northwest EcoBuilding Guild
- Universities
- Governments
- Building code officials
- Architects
- Contractors
- Consumers

The precise method of implementing each action depends upon the context in which it moves forward and the resources available to the State and other entities. Because it is not possible to foresee these circumstances and predict resource availability at this time, the consultant team uses the State as a placeholder throughout this paper.

METHODOLOGY

The research team relied on several means of collecting and analyzing information in preparation for this report.

- **Interviews and meetings** were conducted with Ecology and local government staff, developers, architects, general contractors, remodelers, retailers, deconstruction specialists, non-profit housing developers, waste management specialists, and industry consultants. These conversations helped identify key trends, barriers, and actions needed to transform the building industry to spread green building practices, increase use of green building materials, and maximize recovery of construction and demolition debris. Appendix A provides a complete list of the experts interviewed for this study.
- **Literature research** enabled us to collect pertinent articles in industry journals, and review the content of a wide variety of green building websites. This research supplemented personal interviews to further establish future possibilities and to help evaluate possible options.
- **Analysis of possible tools** consisted of evaluating possible actions based on feasibility, expected impact, cost-effectiveness, and expected challenges.

Who are the experts?

The consultant team conducted interviews and meetings with 30 Green Building experts. Here's how they break down geographically:

- 10 are from eastern Washington
- 17 are from western Washington
- 3 are from outside Washington

Here's what the experts do for a living. Several experts fall into more than one category:

- 9 are architects
- 8 are contractors or remodelers
- 6 work for state or local government
- 3 represent trade associations
- 2 are deconstruction specialists
- 2 work for non-profit organizations
- 2 are recyclers
- 1 sells building materials
- 1 is a developer
- 1 is an urban planner

Naturally, this analysis is limited by our inability to predict the future societal and economic trends that will influence the construction industry, waste generation and value of natural resources. Nevertheless, the research team strove to use its research and analysis to find places where organized and concerted strategic actions can have dramatic future effects.

The results of this work are presented below in four sections. Chapter 2 describes the current state of the construction industry, the extent of green building, and current trends. Chapter 3 is a simple primer on the construction industry players and process, the leverage points where the State can influence the industry, and the barriers to green building that currently exist. Chapter 4 evaluates the tools that the State could use to overcome these barriers, and Chapter 5 sets forth an action plan to make these goals a reality.

2. What's Happening Now?

This chapter provides an overview of the size and environmental impacts of the building industry in Washington, green building's share of the market, and some of the key trends in building related to green building, waste, and materials.

TRADITIONAL BUILDING

The building industry long has been a strong component of Washington's economy. Since the early 1980s, the construction industry has represented about 5 percent of the gross state product in Washington; in 2000, this represented \$11.3 billion of Washington's economy.⁶ There are about 21,300 construction firms in Washington, employing about 151,000 employees (see Table 1 below).⁷ Thirty-nine percent, or 8,244 of all construction firms in the state, are building, developing, and general contracting firms, as opposed to heavy construction firms or special trade contractors such as plumbers, electricians, painters, carpenters, and masons.

According to the Washington State Office of the Forecast Council, the rate of new residential construction in Washington will average nearly 40,000 new housing units per year over the next few years; 72 percent of these new housing units will be single-family homes.⁸

Table 1: A Profile of the Construction Industry in Washington

	Number of Firms	Number of Employees
Building, Developing, & General Contracting	8,244	45,040
Heavy Construction	1,123	18,672
Special Trade Contractors	11,906	87,624
Total	21,268	151,336

Note: The total number of firms includes 5 uncategorized firms.

Source: U.S. Census Bureau, Statistics of U.S. Businesses, www.census.gov/susb/1999/wa/WA23.htm.

⁶ U.S. Bureau of Economic Analysis, Gross State Product Data, 6/10/02, available at <http://www.bea.doc.gov/bea/regional/gsp/>, accessed 10 Dec. 2002.

⁷ U.S. Census Bureau, "Statistics of U.S. Businesses: 1999: Construction, Washington," December 21, 2001, available at www.census.gov/epcd/susb/1999/wa/WA23.HTM, accessed 25 Nov. 2002.

⁸ Based on the number of housing units forecasted to be authorized by building permit per year for 2002-05, from Washington State Office of the Forecast Council, "Washington Economic Forecast Summary: Forecast 2002 to 2005," Preliminary Economic Forecast Summary Tables, November 6, 2002, available at www.wa.gov/ofc/pubs/t1002.pdf, accessed 25 Nov. 2002.

Traditional construction can adversely affect the environment in a variety of ways, including habitat destruction, energy consumption, climate change, resource depletion, waste generation, generation of toxic wastes, and poor indoor air quality. Nationally, this amounts to considerable use of resources and generation of waste, as the following examples illustrate.

- The average U.S. household consumes 146,000 gallons of water per year; domestic and commercial water consumption represents 12.2 percent of all water used nationwide.⁹
- Almost two-thirds of all electricity and 36.4 percent of all primary energy consumed in the U.S. are used in residential and commercial buildings.¹⁰
- Residential and commercial energy consumption accounts for 30 percent of total U.S. greenhouse gas emissions.¹¹
- Sixty percent of the total annual use of ozone-depleting substances in the U.S. is for building construction and building systems.¹²

WASTE-RELATED IMPACTS OF TRADITIONAL BUILDING

The total amount of waste generated through construction and demolition (C&D) of buildings is considerable, both nationally and in Washington. In 1996, according to an Environmental Protection Agency (EPA) study, 136 million tons of building-related C&D debris were generated nationwide, not including roadway, bridge, and land clearing debris; this equates to a per capita waste generation rate of 2.8 pounds per person per day.¹³ Forty-three percent of C&D waste nationally is from residential sources and 57 percent is from nonresidential sources. In Washington, at least 2.6 million tons of C&D waste were generated in 2000, not including C&D wastes disposed of at municipal solid waste landfills that do not track C&D waste separately.¹⁴ In King County (excluding Seattle), 670,000 tons of construction and demolition debris are generated annually, but unlike the national average, about 60 percent is from residential construction and about 40 percent is from nonresidential construction.¹⁵

⁹ Data from the U.S. Geological Survey (1995 water use) and the American Water Works Association Research Foundation (1999 household water use), as cited in Alex Wilson and Peter Yost, "Buildings and the Environment: The Numbers," *Environmental Building News*, Vol. 10, No. 5 (May 2001), available at www.usgbc.org/Resources/industry_statistics.asp, accessed 11 Dec. 2002.

¹⁰ Data from U.S. Department of Energy, Energy Information Administration, March 2001, as cited in Wilson and Yost, 2001.

¹¹ Data from U.S. Department of Energy, Energy Information Administration, October 2000, as cited in Wilson and Yost, 2001.

¹² Estimates for 2000 from computer model maintained by EPA, Global Programs Division, as cited in Wilson and Yost, 2001.

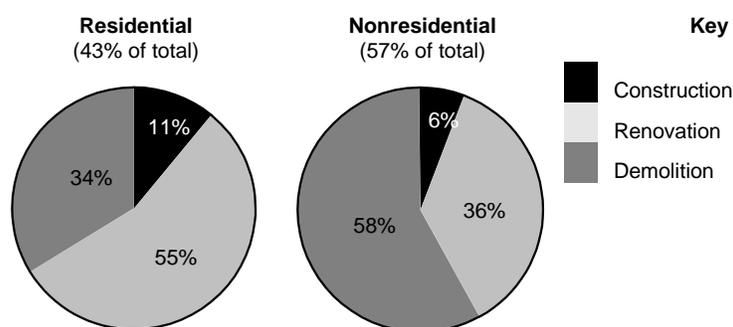
¹³ Franklin Associates *Characterization of Building-Related Construction and Demolition Debris in the United States*, prepared for the Environmental Protection Agency, Office of Solid Waste, June 1998, available at www.epa.gov/epaoswer/hazwaste/sgg/c&d-rpt.pdf, accessed 12 Dec. 2002.

¹⁴ Based on reported disposal of inert, demolition, and wood waste and C&D waste diversion in 2000, from Department of The State, Solid Waste and Financial Assistance, 2001, "Solid Waste in Washington State, Tenth Annual Status Report."

¹⁵ Cascadia Consulting Group, 2002.

Renovation and demolition of buildings, rather than new construction, represent the majority of C&D debris. Nationally, demolition accounts for 48 percent of the building-related C&D debris generated annually, while renovation and new construction account for 44 percent and 8 percent, respectively.¹⁶ The majority (55 percent) of residential C&D wastes are from renovation, while the majority of nonresidential C&D wastes (58 percent) are from demolition (see Figure 1). This suggests that to achieve the greatest benefits in reducing C&D wastes, green building efforts should target renovation of residential buildings and demolition of commercial buildings as well as new construction of all types of buildings. Although new construction generates less waste than renovation and demolition, it presents the greatest opportunity to incorporate green building techniques and materials.

Figure 1: Sources of U.S. Building-Related Construction and Demolition Debris¹⁷



Studies of C&D wastes indicate that recycling and recovery rates for construction and demolition wastes in Washington may exceed national rates. In 2000, about 1.3 million tons of C&D waste were diverted from disposal in Washington, including 893,218 tons of concrete and asphalt, 14,412 tons of roofing shingles, and 376,684 tons of other C&D debris.¹⁸ Thus, as much as 49 percent of C&D waste generated each year in Washington is diverted from disposal. However, a significant percentage of this diverted waste is down-cycled, or diverted to lower-value uses. For example, a primary use of salvaged wood waste is to burn it as hog fuel, which is a consumptive use and is not recycling by definition. This use of wood is less desirable than turning wood waste into finger-jointed studs or roof trusses.

Nationally, the EPA estimates that only 20-30 percent (or 25-40 million tons in 1996) of construction and demolition debris are recovered for recycling.¹⁹ The primary components of C&D waste are wood and concrete; gypsum, roofing, glass, carpets, and metals make up the remainder of the C&D debris (see Table 2 below for a detailed analysis of C&D waste composition in King County). Although the relative composition of C&D debris is highly variable by site, the largest component of waste generation at

¹⁶ Franklin Associates, 1998.

¹⁷ Adapted from Franklin Associates, *Characterization of Building-Related Construction and Demolition Debris in the United States*, prepared for EPA, 1998.

¹⁸ Department of Ecology, 2001.

¹⁹ Franklin Associates, 1998.

construction and renovation sites is wood, while concrete generally is the largest component of demolition debris.²⁰

Table 2: Estimated Annual Recycling and Disposal of Construction and Demolition Debris from King County (Excluding Seattle)

C&D Material Type	Estimated Annual Tons Processed from King County	Estimated Annual Tons Disposed from King County	Estimated Recovery Rate
Wood	210,000	121,000	60-70%
Concrete	190,000	5,000	>95%
Gypsum	7,000	20,000	20-30%
Roofing	1,000	16,000	5-10%
Glass	<50	5,000	<1%
Carpet/Pad	<2,000	16,000	<10%
Metals	N/A	29,000	N/A

Source: Cascadia Consulting Group, *Waste Monitoring Program: Construction & Demolition Waste Characterization and Recycling Industry Profile, Revised Draft Report*, prepared for the King County Solid Waste Division, Seattle, WA, 2002.

In addition to total waste generation and disposal, another important waste-related environmental impact of construction is the relative hazard or toxicity of building materials. Potentially dangerous or hazardous wastes in buildings include the following materials:

- Treated wood may contain arsenic, chromium, lead, pentachlorophenol, or creosote pesticides.
- Paint and coatings may contain asbestos, lead, mercury or PCBs.
- Plumbing and pipes may contain asbestos or lead.
- Fluorescent and high intensity discharge (HID) lamps may contain lead, mercury or PCBs.
- Batteries may contain lead, mercury or PCBs
- Thermostats, switches, and other electrical devices may contain mercury.
- Other potentially regulated building wastes (siding, flooring, insulation, fireproofing, vinyl, plaster, wallboard, adhesive, caulk and other materials) are known to contain asbestos and PCBs.²¹

The presence of hazardous materials in buildings has upstream impacts as well as implications for indoor air quality during building operation and the potential to reuse and recycle materials at the end of a building's life.

²⁰ Composition of C&D debris is based on a waste characterization study conducted for King County, Washington, by Cascadia Consulting Group, 2002.

²¹ List of hazardous materials in demolition debris from the Washington Department of Ecology, Hazardous Waste & Toxics Reduction Program, Demolition Debris Resources webpage, <http://www.ecy.wa.gov/programs/hwtr/demodebris/index.html>, accessed 22 Jan. 2003.

GREEN BUILDING STANDARDS

As defined above in the Introduction, green building includes the design of buildings so that their adverse effects upon the environment are reduced or eliminated. This section discusses two standards that have been developed to determine whether a building is built green, and the extent to which these standards can be used as an indicator that the building industry is moving toward the Beyond Waste Vision.

LEED™ STANDARDS

The US Green Building Council developed the LEED™ standard, or Leadership in Energy and Environmental Design, which their website describes as “a voluntary, consensus-based national standard for developing high performance, sustainable buildings.” There are different versions of LEED™ for commercial construction and major renovation, existing buildings, and commercial interiors. Each version contains a checklist of credits that a building project can achieve in the following categories: sustainable sites, indoor environmental quality, energy and atmosphere, water efficiency, innovation and design process, and materials and resources. Projects must achieve a certain number of credits to be certified at a variety of levels, currently Bronze, Silver, Gold, and Platinum. The LEED™ standards can be viewed online at http://www.usgbc.org/LEED/LEED_main.asp.

The LEED™ standards have helped to define green building and have set a benchmark for green building practices nationwide. However, it is reasonable to ask whether buildings that meet LEED™ standards really achieve the State’s goals for the Beyond Waste Vision, not to mention energy and water efficiency, air quality, and wise land use.

Without quantitative data, it is not possible for the consultant team to answer this question definitively. However, given the LEED™ criteria for Materials and Resources, it seems reasonable to assume that projects that meet some or all of these criteria move much closer to the Beyond Waste Vision than projects that don’t. The criteria for Materials and Resources allow architects and contractors to choose from a menu of options that includes the following.

- Reusing 75-100% of the existing building shell
- Diverting 50-75% of waste from the landfill
- Using salvaged or reused materials for 5-10% of the building materials
- Using recycled-content materials for 5-10% (post-consumer) or 10-20% (post-consumer and post-industrial) of building materials
- Ensuring that 20% of building materials are manufactured regionally
- Ensuring that 50% of building materials are extracted locally
- Ensuring that rapidly renewable materials account for 5% of the total value of the building products
- Using certified wood for 50% of wood-based materials and products

These criteria focus on waste reduction and recycling goals that fit well within the Beyond Waste Vision: reuse of whole building shells or salvaged materials, diversion of

significant amounts of waste from the landfill, and the use of recycled-content, regional, renewable, and sustainable materials. However, the criteria are not perfect: they do not specify the use of non-toxic materials, or products other than wood that are sustainably harvested or produced, for example. They also may set a benchmark that is too low to achieve the Beyond Waste Vision – in other words, a building may be built to LEED™ standards but still generate construction and demolition waste or incorporate toxic materials.

For the purposes of this paper, the consultant team has assumed that increasing the use of LEED™ standards will help achieve the Beyond Waste Vision, as well as other environmental goals. However, the true environmental performance of LEED™ certified buildings should be evaluated to determine whether they go far enough toward the Beyond Waste Vision.

RESIDENTIAL GREEN BUILDING STANDARDS IN WASHINGTON

In addition to the national LEED™ standards, green building standards have also been developed for residential construction and renovation as part of several local green building programs in Washington State. The Built Green™ program of the Master Builders Association of King and Snohomish Counties, the BUILT GREEN/Build a Better Kitsap program of Kitsap County, and the Build a Better Clark program of Clark County all have self-certification programs for green residential construction. Although the specific checklists and certification processes in these programs vary, all three programs have three levels of green certification, as indicated by one, two, or three stars.

These local green building certification programs are similar to the LEED™ program in that they too incorporate checklists of criteria that provide a guide to builders and owners for how to construct green buildings. These local programs, however, focus on construction and renovation of single-family homes, whereas the national LEED™ standards currently exist only for commercial, institutional, and multi-family buildings.

To illustrate the kinds of green certification programs in existence at the local level in Washington, we further describe the standards of the King and Snohomish County Built Green™ program. The checklist for the King and Snohomish County Built Green™ program can be viewed at <http://www.builtgreen.net/checklist.html>. Like the LEED™ standards, the Built Green™ checklist contains a variety of credits in six categories, although the categories are slightly different:

- Green Building Codes
- Site & Water Protection
- Energy Efficiency
- Health and Air Quality
- Materials Efficiency
- Environmentally Responsible Home Ownership

Although the specific credits are too numerous to list here, they focus on the same goals as those for the LEED™ standards: waste reduction, reuse, and use of recycled-content or more environmentally friendly materials.

As with the LEED™ standards, it is not possible to discern quantitatively whether homes that are built according to Built Green™ or similar standards truly are fully sustainable

buildings. However, given that the criteria emphasize goals similar to the Beyond Waste Vision, the consultant team has assumed throughout this study that the use of Built Green™ standards does help move Washington State toward the Beyond Waste Vision. As with the LEED™ standards, this assumption should be examined through an assessment of the actual environmental performance of homes built using the Built Green™ standard to determine whether the standards are effective at helping to achieve Beyond Waste goals.

MARKET SHARE OF GREEN BUILDING

There is currently no single, uniform measure of the number of green buildings in Washington; however, the level of participation in established green building programs such as LEED™ or Built Green™ provides an indication of the market share of green building. There are two important caveats to note when using these data:

- Many more buildings have likely been built with environmental features than are indicated by the numbers of green-certified buildings. For example, the BUILT GREEN/Build a Better Kitsap program estimates that there are about a hundred more buildings in Kitsap County—nearly as many as those that have been certified—that would qualify as green buildings according to the program’s criteria.²²
- As discussed above, green-certified buildings vary in the amount and type of environmental features they contain; most certification programs, for example, include several levels of green certification. Certified green buildings may not be fully sustainable; even if all construction or renovation projects in Washington met the LEED™ or Built Green™ standards, improvements in materials use, recycling, and building design might still be needed to achieve the Beyond Waste Vision for the built environment.

Bearing in mind these caveats, participation in green building certification programs suggests that there are currently few green buildings in Washington. There is, for example, only one commercial building in Washington—IslandWood on Bainbridge Island—that has been certified by the LEED™ standard of the U.S. Green Building Council. There are, however, 38 commercial building projects awaiting LEED™ certification in Washington, and an unknown number of buildings may have many environmental and energy efficiency features of green buildings even though the building owners or developers have not chosen to apply for LEED™ certification.

Green building does appear to be penetrating the housing market in Washington. For example:

²² Shana Baird, Built Green/Build a Better Kitsap Program, personal communication with the authors, 5 Dec. 2002.

- Based on participation in local green building programs throughout the State, almost 1,800 residences, or about 0.1% of all housing units in Washington, may be considered green buildings.²³
- Considering how long these programs have been in existence (ranging from two to five years), this implies that about 2 percent of new housing units in Washington are built and self-certified as green buildings each year.

Green building appears to be becoming increasingly common in some local markets in Washington. Local residential green building programs exist in King, Snohomish, Clark, and Kitsap Counties; Pierce County and Spokane County reportedly are considering developing green building programs. In Snohomish and King Counties, where green building appears to be most common, 5.3 percent of new homes are built and certified through the Built Green™ program. Overall, about 4 percent of new residential construction (or 843 of the 20,602 homes constructed each year) in King, Snohomish, Clark, and Kitsap counties—the four counties with green building certification programs—is self-certified as green. In Spokane County, the Sustainable Housing Innovation Partnership (SHIP) of the Spokane Neighborhood Action Programs (SNAP), a non-profit community development organization, is currently constructing a five-building, 52-unit sustainable community housing development for low-income residents. Over the seven-year life of the SHIP program, an estimated 140 sustainable housing units will be built in Spokane County. Based on these numbers, green building currently seems to be a niche, rather than mainstream, market, largely confined to major metropolitan areas in Washington.

MARKET DEMAND FOR GREEN BUILDING

Market research suggests that demand for green buildings may exceed current supply, so opportunities for expanding green building's share of the market are promising.

- Surveys indicate that most consumers prefer homes that are energy efficient, use fewer resources, and have healthy indoor air quality.²⁴ In a survey of new homebuyers in the Denver area, for example, more than half to three-fourths of respondents rated energy efficiency, water efficiency, healthy indoor air, and preservation of natural resources as “important” or “very important;” respondents who had heard of the local green building program valued these features even more.²⁵

²³ Counts of green buildings in Washington from Shana Baird, Built Green/Build a Better Kitsap Program, personal communication with the authors, 5 Dec. 2002; Kathy Lykken, Master Builders Association of King and Snohomish Counties, personal communication with the authors, 11 Dec. 2002; and Built Green, “Frequently Asked Questions,” <http://www.builtgreen.net/faqs.html>, 20 Dec. 2002. Number of housing units constructed annually based on Washington State Office of Financial Management, “Provisional Total Housing Units for Cities, Towns, and Counties: April 1, 1990, April 1, 2000, April 1, 2001, April 1, 2002,” *2002 Population Trends for Washington State*, available at www.ofm.wa.gov/pop/poptrends/poptrends.pdf, accessed 25 Nov. 2002.

²⁴ Several surveys suggesting that consumers prefer these features are described in these sources: Alex Wilson et al., *Green Development: Integrating The State and Real Estate*, (New York: John Wiley & Sons, Inc., 1998) 20-23, and Built Green, “Builder Information/Certification,” <http://www.builtgreen.net/certification.html>, 10 Dec. 2002.

²⁵ Results of a Genesis Group study in Denver, as reported in David Johnston, *Building Green in a Black and White World: A Guide to Selling the Homes Your Customers Want*, (Washington: Home Builder Press, 2000) 15.

- In a national survey conducted in 2001, however, 80 percent of consumers said that new homes do not meet their demands regarding environmental features.²⁶

Not only do consumers prefer environmental features, many say they would pay more for them, at least initially. According to one national survey, the overwhelming majority of buyers (96 percent) say they are willing to pay more upfront for green features.²⁷ Furthermore, almost two-thirds of buyers say they would prefer to use the savings from energy-efficiency investments to offset the cost of other green-building improvements rather than make other upgrades.

Similarly, in Kitsap and Clark counties, sixty-nine percent of home buyers are willing to pay more for energy efficient houses that have lower utility bills, based on surveys conducted in 1998 and 1999.²⁸

Although it is possible that consumers do not actually spend as much on green features as they claim they are willing to pay, builders may underestimate consumer demand for green building features. For example, while 55 percent of homebuyers said they would pay \$5,000-\$10,000 more for green features in 2001, only 19 percent of builders said that buyers would pay that much.²⁹

This market research suggests that there is a viable market for green building, and that education of both builders and buyers might be a useful tool for fostering its growth.

KEY TRENDS IN BUILDING

Some of the key national trends in building related to green building, waste, and materials include the following.

- **The total environmental impact of building seems to be increasing, yet efficiency in the use of some resources is improving.** On the one hand, the amount of urbanized land in America is increasing at 2.65 times the rate of population growth, and the average house size has increased 105 percent since 1950.³⁰ On the other hand, construction and demolition debris is increasingly being recovered in the U.S. and the energy intensity of our economy has declined by 42 percent since 1973.³¹ Much needs to be done, therefore, to transition to a sustainable built environment.
- **Recycling and reuse of construction and demolition debris is increasing in Washington.** As markets for concrete and wood wastes have developed, diversion of C&D wastes in Washington has grown steadily over the past 10 years. Concrete recycling, for example, has grown approximately 175 percent,

²⁶ Jennifer Roberts, "The State of Green Building," 2001 Report, www.housingzone.com/green/index.asp, accessed 3 Dec. 2002.

²⁷ Roberts, 2001.

²⁸ Built Green, "Builder Information/Certification," <http://www.builtgreen.net/certification.html>, 10 Dec. 2002.

²⁹ Roberts, 2001.

³⁰ Data on urbanized land from EPA, 2000, and data on building size from U.S. Census Bureau, as cited in Wilson and Yost, 2001

³¹ C&D waste recovery from Franklin Associates, 1998; energy intensity from American Council for Energy Efficiency Economy, as cited in Wilson and Yost, 2001.

and much of this growth has occurred outside King County. Increasing disposal costs appear to have led contractors to seek other options for managing heavy waste materials such as concrete, including increased jobsite recycling and minimization of construction wastes. The private recycling industry is growing to accommodate the need for recycling of C&D debris; at least 11 new companies have started since 1995 to process these wastes.³² However, some of these wastes are down-cycled rather than recycled or reused.

- **Green building materials may be costing more despite the fact that they are becoming more available.** Based on national surveys of homebuilders and consumers conducted in 2000 and 2001, green building materials are becoming available in more markets, but the additional initial price of green building materials is increasing.³³ (As an example of the increasing availability of green building materials, the area of forestland certified by the Forest Stewardship Council increased from 1.8 million acres worldwide to 47.2 million acres from 1994 to 2000.³⁴) Part of the reason for the increased costs of green building materials is that product selection, and therefore the competitiveness, of green building products has been limited in the past. Thus, to the extent that increased upfront costs for green building materials discourage green building, as indicated by market research and many of the experts interviewed for this report, there are important economic barriers to making green building mainstream.
- **Although use of recycled-content building materials is becoming more common, trends towards increased use of composite building materials and adhesives may make future reuse and recycling of building materials more difficult.** More and more building products are being offered with recycled-content materials. Moreover, re-manufactured, engineered wood products are becoming more common. Building materials are increasingly made of composite materials, consisting of both natural and manmade materials. The problem with composite materials is that they are difficult to take apart for recycling. Wood-plastic composite sheathing products, for example, are quickly entering the market, yet even though these may use recycled feedstock (plastic film), they may not be easily recoverable themselves. Moreover, adhesives are being used instead of fasteners in construction, potentially making otherwise recyclable materials neither reusable nor recyclable. These examples illustrate the importance of considering the full life cycle, including deconstruction or reuse of buildings, when choosing building materials and constructing green buildings.
- **Participation in the LEED™ national green building program is accelerating, and awareness of green building is increasing accordingly.** Nationally, 592 building projects have registered their intent to seek LEED™ certification and 36 buildings have been certified since the program began in 1998. The number of buildings registering per year for LEED™ certification is increasing rapidly (see Figure 2). The trend for buildings in Washington is even more pronounced. While only one commercial building in Washington has been certified through LEED™,

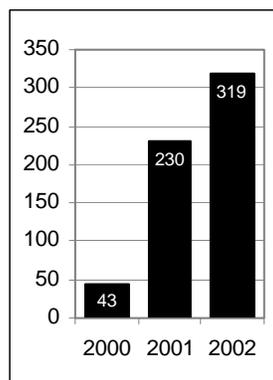
³² King County Department of Natural Resources and Parks, "Summary Report of the 2001 Survey of Washington State's Recycling Industry: Results of the 2001 Survey of Recycled Material Collectors and Haulers, Transporters, Processors, and Re-Manufacturers, Final Report," Prepared by Cascadia Consulting Group, September 2002.

³³ Roberts, 2001.

³⁴ Data from the U.S. Forest Stewardship Council, as cited in Wilson and Yost, 2001.

there are 38 Washington building projects awaiting LEED™ certification; two-thirds of these are public projects.³⁵ Furthermore, many States and municipalities—including Seattle, Portland, and Vancouver—have adopted the LEED™ standards for major construction and renovation projects. Contractors and others in the building industry are becoming increasingly aware of green building techniques and materials in part because of the LEED™ certification program. Experts interviewed for this report noted that LEED™ certification is becoming the standard for benchmarking of nonresidential green building projects and is helping to drive improved performance.

Figure 2: Number of Building Projects Registered for LEED™ Certification Per Year³⁶



- State and local green building programs are becoming more common and tend to emphasize economic incentives, education, and procurement policies.** As of early 2002, according to a study by the National Association of Home Builders, over 18,000 homes had been built in compliance with 26 residential green building programs nationwide.³⁷ About 10 percent of those homes are in Washington State. Common components of green building programs include economic incentives (e.g., voluntary certification, reduced mortgage rates, tax credits, loans, and grants), education and awareness building (e.g., websites, informational materials, and trainings), and procurement policies or other requirements to promote green building (e.g., requiring LEED™ certification and changing building codes). These programs are encouraging green development by stimulating demand for green buildings through public construction, increasing awareness of green building materials and techniques through education, and removing or decreasing barriers to green building through economic incentives and other tools. See Table 3 for an overview of State green building initiatives.

³⁵ Sabrina Morelli, U.S. Green Building Council, personal communication with the authors, 12 Dec. 2002.

³⁶ Sabrina Morelli, U.S. Green Building Council, telephone conversation, Dec. 12, 2002.

³⁷ National Association of Home Builders Research Center, *Summary of Existing Green Building Programs*, Second Edition, July 2002, available at www.nahbr.org/green3.asp?CategoryID=1801, accessed 7 Dec. 2002.

Green building practitioners in Washington noted similar trends related to green building, materials, waste, and recycling in interviews conducted for this issue paper. The most frequently cited trends were choice of building materials (including using recycled materials), minimization of construction waste, design for less waste, and the use of LEED™ and other standards. Other trends mentioned included deconstruction and jobsite recycling.

IMPLICATIONS OF CURRENT CONDITIONS FOR BEYOND WASTE VISION OF GREEN BUILDING

As this chapter has shown, achieving the Beyond Waste Vision for the built environment—where all buildings are designed and built green, disposal of construction and demolition debris is minimized, and buildings materials are sustainable and nontoxic—will require significant, long-term changes in building practices, such as the following:

- Increasing green building's share of new residential construction from 2 percent to 100 percent,
- Increasing recycling and recovery rates for construction and demolition debris from 49 percent or less to nearly 100 percent while minimizing the amount of “down cycling,” and
- Phasing out the use of toxic materials.

These transitions will not be easy or quick, but they have the potential to provide significant environmental, economic, and human health benefits for the people of Washington. Fortunately, green building is already a movement within the building industry that is gaining momentum daily. As a result, many of these actors are beginning to take action, and the transformation that is Beyond Waste has already begun. However, much more aggressive action is necessary to achieve the Vision fully. The Action Plan presented in Chapter 5 describes actions that the State can take in much more detail.

The next chapter describes the economic actor sectors that will be crucial to this transition, as well as the key barriers and the leverage points for advancing green building in Washington.

Table 3: State Government Green Building Initiatives

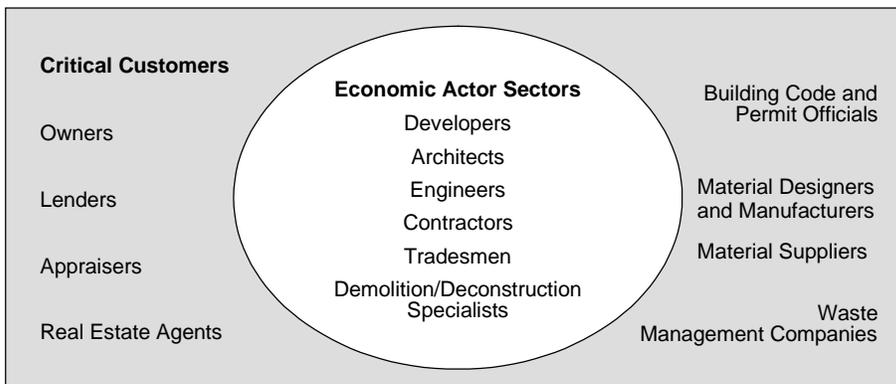
State	Economic Incentives	Education	Requirements / Policies	Website(s)
California	<ul style="list-style-type: none"> State grants to local government for program development and construction 	<ul style="list-style-type: none"> Website Publications and materials Training and seminars 	<ul style="list-style-type: none"> Green office furniture procurement requirements for state government 	http://www.ciwmb.ca.gov/GreenBuilding/
Colorado	<ul style="list-style-type: none"> Voluntary certification program for residential construction 	<ul style="list-style-type: none"> Website Publications and materials Training and seminars Awards 		http://www.builtgreen.org
Connecticut		<ul style="list-style-type: none"> Website Publications and materials 	<ul style="list-style-type: none"> Considering legislation that would require LEED™ certification for buildings with 25%+ state support 	http://dep.state.ct.us/wst/recycle/greenb.htm
Maryland	<ul style="list-style-type: none"> Corporate Income Tax Credit for commercial, industrial, and multi-residential green buildings (6-8%) 	<ul style="list-style-type: none"> Website Publications and materials Training and seminars 	<ul style="list-style-type: none"> LEED™ certification required for all capital projects 5,000+ gross sq. feet 	http://www.dgs.state.md.us/GreenBuildings/default.htm http://www.dnr.state.md.us/smartgrowth/ed/
Massachusetts	<ul style="list-style-type: none"> Green Schools Initiative provides info and funding for green schools design/build Legislation introduced for tax credit based on NY legislation 	<ul style="list-style-type: none"> Website Publications and materials State tests materials for environmental attributes 	<ul style="list-style-type: none"> LEED™ certification encouraged for state buildings by Dept. of Capital Asset Management 	http://www.state.ma.us/osd/enviro/products/grenbldg.htm http://www.mtpc.org/RenewableEnergy/Green_Buildings.htm
New York	<ul style="list-style-type: none"> Green Building Tax Credit for commercial and multi-residential green construction and renovation (5-7%) 	<ul style="list-style-type: none"> Website Publications and materials Training and seminars Awards 	<ul style="list-style-type: none"> LEED™ certification encouraged for state buildings by Executive Order 	http://www.dec.state.ny.us/website/pu/grnbldg/index.html
New Jersey		<ul style="list-style-type: none"> Training and seminars 	<ul style="list-style-type: none"> Economic Development Authority encourages LEED™ certification on its \$12 billion public school construction program 	http://www.state.nj.us/dep/dshw/recycle/bias2002.htm
Oregon	<ul style="list-style-type: none"> Oregon's 35% Business 		<ul style="list-style-type: none"> Executive Order (E-00-07) directs 	http://www.energy.state.or.us/bus/ta

State	Economic Incentives	Education	Requirements / Policies	Website(s)
	Energy Tax Credit for commercial development is tied to LEED certification		the state to pursue use of LEED™ standard for state building construction projects	x/taxcdt.htm http://www.oregonsolutions.net/execOrder/sustain_eo.cfm
Pennsylvania		<ul style="list-style-type: none"> ▪ Website ▪ Publications and materials ▪ 	<ul style="list-style-type: none"> ▪ LEED™ Silver certification is required for new construction RFPs issued by state ▪ State office leasing requirements include green design criteria 	http://www.gggc.state.pa.us/building/default.htm
Washington		<ul style="list-style-type: none"> ▪ Website ▪ Publications and materials ▪ Training and technical assistance 	<ul style="list-style-type: none"> ▪ Executive Order on sustainability of State government operations ▪ Standards for construction waste management for state projects ▪ Considering adopting LEED™ certification for State building projects 	http://www.ecy.wa.gov/programs/swfa/cdl/index.htm
Wisconsin	<ul style="list-style-type: none"> ▪ Voluntary certification program for residential construction 	<ul style="list-style-type: none"> ▪ Website ▪ Publications and materials ▪ Training and seminars 		http://www.wi-ei.org/GBH/

3. A Building Industry Primer

This section presents a simplified introduction to the economic actor sectors and critical customers of the building industry. Economic actor sectors are the groups who generate most of the activity in the industry. Critical customers are those groups who strongly influence the economic actor sectors through their activities. Figure 3 illustrates the concept of the core economic actor sectors, and the critical customers who surround and influence them.

Figure 3: The Building Industry: Economic Actor Sectors and Critical Customers



In order for the State to select the tools that will cause the greatest change, it must understand these groups and the places where the tools might be most effective. Those places are called leverage points. This chapter also identifies key leverage points in the building process and discusses the major barriers to expanding green building practices in Washington State.

ECONOMIC ACTOR SECTORS

The economic actor sectors in the building industry are those who normally leap to mind when considering the industry: developers, architects, engineers, contractors, tradesmen and demolition/deconstruction specialists. These economic actor sectors and their roles in green building are described below.

Developers oversee construction of buildings or groups of buildings, such as office towers or subdivisions. Sometimes a building’s owner hires a developer, but frequently developers construct buildings and find buyers for them later, a process called speculative or “spec” building. In such cases, the developer is the decision-maker and goal-setter for the building, and controls the use of green building practices and materials. Because developers sell buildings once they are built, however, many of the benefits of green building, such as reduced energy and water bills, do not accrue to them.

Architects design buildings. Therefore, they have the ability to incorporate green technologies and materials into buildings, and design buildings so that they generate less waste in the first place.

Engineers design building systems, such as heating, ventilation, and air conditioning (HVAC) systems, or lighting, structural, or plumbing systems. When recruited to the design team early in the process, engineers can help to ensure that a buildings mechanical and HVAC systems support the environmental objectives of the designers and owners.

Contractors build buildings. Responsibility for jobsite recycling, waste reduction, and materials handling rests with them. In addition, contractors need to be familiar with green materials and technologies in order to handle and install them correctly.

Tradesmen assist contractors with building construction. Usually, these are skilled workers such as plumbers, electricians, or masons. Like contractors, tradesmen must be familiar with green materials and technologies in order to incorporate them effectively.

Demolition/deconstruction specialists take buildings down. For the purposes of this paper, demolition specialists are those who knock buildings down using heavy equipment such as wrecking balls and bulldozers. Deconstruction specialists are an emerging field of people who take buildings apart using primarily hand tools such as crowbars, and who salvage most or all of these materials for reuse and resale. Obviously, deconstruction is more of a green building practice than traditional demolition, but it often takes longer than demolition does.

CRITICAL CUSTOMERS

As noted above, critical customers are those groups who have the power to affect economic actor sectors' decisions and actions. In the case of the building industry, these are the building owners, lenders, appraisers, real estate agents, building code and permit officials, materials suppliers and waste management companies. Each of these groups and its role in green building is described briefly below.

Owners are perhaps the most powerful customers of the building industry. Owners of buildings and homes set the goals for a building and make final decisions about all aspects of a building, including cost, materials, and technologies used. In effect, owners are the demand side of the building industry economic equation.

Lenders supply a crucial building material: money. Lenders make mortgages and home equity loans available to consumers, and primary and secondary financing available to developers and commercial building owners. If lenders believe that green buildings are more valuable, durable, or efficient to run, they may be willing to provide additional funds or more attractive interest rates for green buildings, thus potentially expanding the demand for green buildings.

Appraisers decide the value of a building. Their decisions affect the amount of financing that a homeowner or developer can obtain. If appraisers assign additional value to a building based upon its green characteristics, owners can secure additional financing, thus making green building more attractive.

Real estate agents sell buildings (and land). Because real estate agents interact with potential owners, they can educate their clients about the benefits of green buildings.

Building code and permit officials decide whether building plans comply with existing law. Often, green building materials and technologies are not specified in existing building codes or land-use regulations, so architects are forced to use their traditional counterparts. If building codes and land-use regulations accommodated green building practices and materials, the supply of green buildings likely would increase.

Material designers and manufacturers are those who develop and create the materials that architects and contractors use to construct buildings. If materials designers and manufacturers created environmentally benign building materials, the use of toxic materials would decrease as the use of recycled-content, easily recyclable, and sustainable building materials would increase.

Materials suppliers are those who provide the multitude of building products needed to construct a building. Suppliers range from family-owned hardware stores to retail giants such as Home Depot to wholesale yards. If green building materials were readily available from suppliers, and if suppliers could explain how to use them, use of these materials likely would expand.

Waste management companies provide containers for jobsite recycling and disposal, recycle debris into feedstocks for other materials, and dispose wastes. The prices and services that these companies offer strongly influence contractors' waste management decisions. Ensuring that recycling is easy and costs less than disposal would encourage additional jobsite recycling.

THE BUILDING PROCESS

This section presents two simplified descriptions of the process of constructing a new building. The first of these describes the traditional building process from concept to construction to demolition. The second describes the emerging green building process.

The purpose of this discussion is threefold:

- To show how the various economic actor sectors and critical customers interact;
- To illustrate the differences in the process of building traditional and green buildings; and
- To provide the background information necessary to understand the leverage points presented later in this chapter. Leverage points are those places in the building process where the State could take action to influence decision-makers such that they choose green building practices over traditional practices.

The first step in any building process is the decision to build a building. For the purposes of this discussion, we shall assume in both cases that a developer has decided to build a speculative commercial building.

TRADITIONAL BUILDINGS

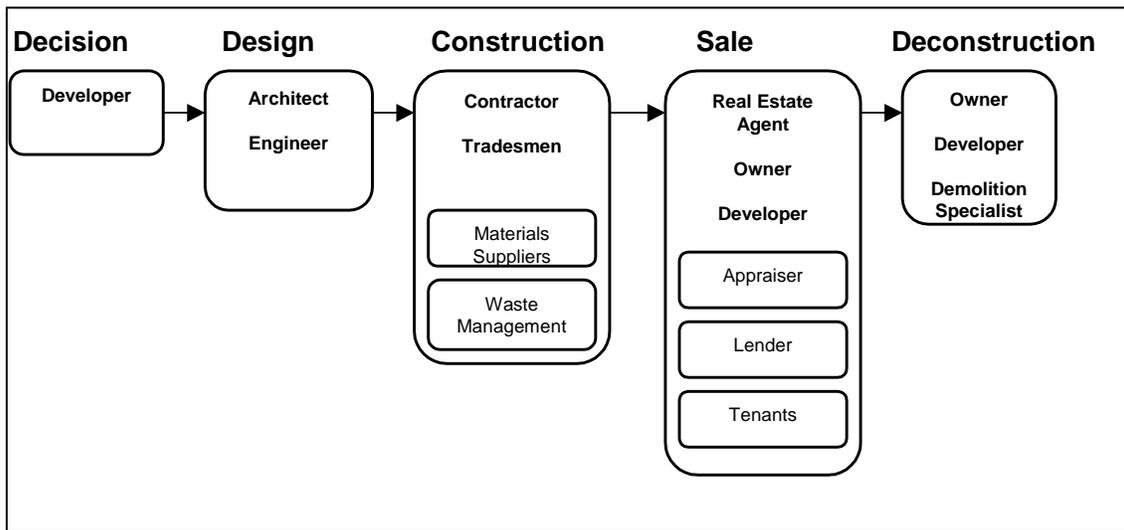
Once this decision has been made, the developer then contacts a lender and negotiates financing for the building, often including the purchase of the building site. Funding secure, the developer contracts with an architect, who designs the building. The developer then takes the design to an engineer, who designs the necessary systems based upon the architect's drawings. Blueprints in hand, the developer next meets with building code officials to obtain permits for the building.

The developer then engages a contractor, who builds the building with the help of various tradesmen. The contractor also is responsible for obtaining construction materials from a variety of materials suppliers, and negotiating the services of a waste management company to handle construction debris.

Upon completion of the building, the developer retains a real estate agent, who finds a new owner for the building. As part of the purchasing process, the owner has the building appraised, and uses that information to obtain financing for the purchase from yet another lender. Transaction complete, the owner (or his/her tenants) moves into the building, and a variety of tenants or owners occupy it for thirty years.

At the close of thirty years, the building no longer meets the needs of its owner, who decides to tear it down.³⁸ The owner obtains a demolition permit, and contracts with a demolition company, which tears the building down in three days, recycling about 60% of the wastes.³⁹ At this point, the cycle may begin again. Figure 4 illustrates this process.

Figure 4: The Traditional Building Process



GREEN BUILDING PROCESS

The only step in this process that is similar to the traditional building process is the first one: the developer decides to build the building. The green developer's next action is to assemble the lender, the architect, the engineer, the contractor, the tradesmen, the building commissioning agent, the future owner or tenant of the building, and the future operations and maintenance staff to participate in a design charrette for the building. At the charrette, the participants agree upon goals for the building, and develop a

³⁸ Many buildings can and do last longer than thirty years. This number was chosen as an only.

³⁹ This was the recycling rate for construction and demolition debris in King County, excluding Seattle, in 2001. (Cascadia Consulting Group, 2002. Waste Monitoring Program: Construction & Demolition Waste Characterization and Recycling Industry Profile, Revised Draft Report. Report prepared for the King County Solid Waste Division, Seattle, Washington.) Although no data on the recycling rate of construction and demolition debris could be found for other parts of Washington, it is likely that this rate represents the high end of the spectrum.

collaborative process for designing and constructing the building. This collaboration serves many functions:

- It allows all participants to understand and internalize the green goals of the building. For example, if the developer has decided to build to LEED™ or Built Green™ standards, the group can decide together which credits to strive for.
- It makes it possible to design the building as an integrated system, rather than a sum of components. For example, the architect and engineer can collaborate to design a building and an HVAC system that work together to provide outstanding indoor air quality while saving energy. Or the contractor can provide insights into green building materials, such as recycled concrete or salvaged lumber, that inform the architect's design.

What's a charrette?

A charrette is an intense, focused working session that brings together the right people with the right skills to make decisions in a short period of time, usually a one or two day workshop.

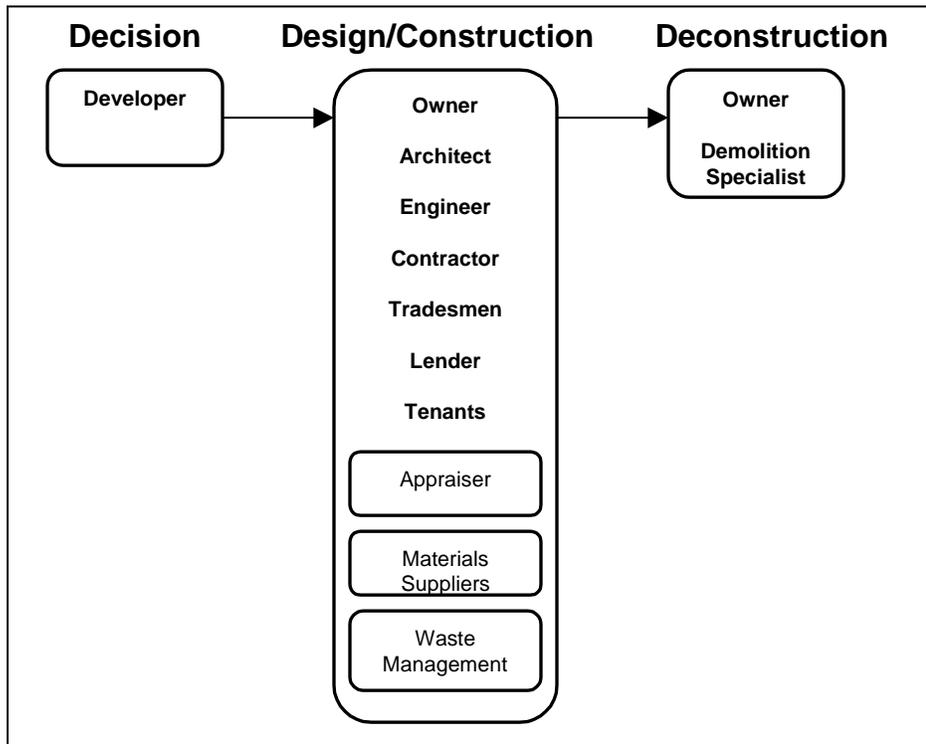
Each economic actor in the charrette serves the same function as in the traditional building process – the architect creates the design, the contractor builds the building, and so on. The difference, however, is that the process is collaborative rather than linear, making it far easier to set and achieve green building goals. This collaborative process continues throughout the design and construction phase, until the building is commissioned and the owner moves in. Commissioning is a process in which a certified professional examines a building's systems and determines that the building is functioning properly.

Because the partners chose durable building materials and technologies, the green building lasts for sixty years. After these sixty years pass, the owner decides the building no longer serves his needs. At this point, the owner has two options: remodel or deconstruct the building. Remodeling is an economical option for this owner because in the design process, the partners developed a flexible design in which simple changes can accommodate different building functions.

However, this owner contracts with a deconstruction firm, which takes the building apart carefully and salvages 80% of the materials from the building.⁴⁰ This high recovery percentage is possible because in the design phase, the partners chose durable materials that also are easy to disassemble. At this point, the building cycle can begin again. Figure 5 illustrates this process.

⁴⁰ This is the lowest recovery rate reported by the RE Store, a Bellingham deconstruction firm. Often they recover as much as 95% of a building.

Figure 5: The Green Building Process



As stated above, these two descriptions of the building process are highly simplified, and many variations on these themes can and do happen. For example, some contractors provide design-build services, while some developers are also contractors. However, these descriptions provide a general overview of the processes that are common in developing traditional and green buildings, and highlight the essential difference between the two processes: one is linear, and the other is collaborative.

LEVERAGE POINTS

As briefly discussed above, a leverage point is a place where a tool has the ability to affect an economic actor sector's waste or material decision and ultimately leverage broader change. A useful analogy for considering leverage points is the concept of the trimtab. A trimtab is a small flap on the back of the rudder of a plane or ocean vessel that applies a small amount of energy to move the rudder, which in turn, alters the course of the vessel. The trimtab is able to exert substantial change by applying energy and pressure strategically to leverage broader change. This section defines and discusses the leverage points associated with the decision points in the building process. Please note that the leverage points described below are not necessarily distinct from each other; often, they overlap, or occur simultaneously or several times.

THE REGULATORY ENVIRONMENT

The codes and other regulations that govern building practices are an important leverage point. If these codes demand or, at the very least, accommodate, reduction of wastes and toxic materials and the use of green building practices, they will spread. Changing codes and regulations so that they favor green building practices would alter the playing field and help to make green building standard practice.

THE DECISION PHASE

The decision phase is an important leverage point. Many of the experts interviewed for this project stated that the most important change needed to transform the building industry would be for owners and developers of buildings to demand green building practices. If owners and developers demand green buildings, then the building industry must provide them or go out of business.

THE FINANCING PHASE

Lenders have a unique opportunity to influence developers and owners through offering additional borrowing power to green buildings. The promise of additional funds to cover green improvements, or better interest rates on a green home than on a traditional home, can make green buildings more attractive. For example, lenders can increase debt-to-income ratios on green homes or provide larger loans for green homes. These incentives are possible because green homes have lower maintenance costs, thereby freeing up funds for homeowners to pay larger mortgage bills.

THE DESIGN PHASE

The most effective leverage point in the building process is the design phase. Many green building techniques, practices, and materials can be incorporated efficiently, economically, and effectively into the design process. Once the design phase is complete, however, these opportunities are no longer available or are much more difficult and costly to add. The design phase represents perhaps the greatest potential for reducing the environmental impacts of buildings, particularly if buildings are designed as integrated systems and building designs consider the full lifecycle of buildings, including deconstruction and reuse of materials.

The term “design for the environment” is a catch-all for a variety of ways that architects and engineers can design buildings and materials so that they have fewer adverse effects upon the environment. The facets of design for the environment include, but are not limited to, design for disassembly, design for less waste, design for toxic reduction or elimination, design for good indoor air quality, design for flexibility, design for worker productivity, and others. Obviously, if the State can influence decision-makers to choose green design methods, a great variety of effective green building practices will result.

THE PERMITTING PHASE

Buildings cannot be built without permits. If building and zoning codes require or provide incentives for green building practices, the building industry likely will adjust to provide them. If permits for green buildings are processed more quickly, builders will take advantage of that incentive.

THE CONSTRUCTION PHASE

Experts noted that even if an architect specifies green materials in his design, if a contractor can't find them or doesn't know how to use them, she'll fall back on tried-and-true, traditional materials. Or she'll submit a bid that is higher than expected because she anticipates extra cost and effort. In addition, contractors are responsible for setting up and maintaining jobsite-recycling services. This leverage point includes contractor education and materials supply.

THE RENOVATION PHASE

Through environmentally sound design and the selection and use of sustainable materials, renovation of existing residential and commercial buildings represents a substantial opportunity to incorporate green building practices and reduce wastes. Renovation and reuse of existing buildings also can reduce the demand for and the environmental impacts of new construction on undeveloped "greenfields."

THE DECONSTRUCTION PHASE

At some point, all buildings come down. If the State can influence building owners to choose deconstruction over demolition, reuse of materials will substantially increase and waste will be reduced.

In summary, the building process offers a number of opportunities for the State to act to bring about change. Although the State and others can influence behavior at any point in the building process, the design phase likely is the most effective place for concerted efforts. The design phase is the point at which most decisions to incorporate green practices and materials are made; once a building reaches the construction phase, deciding to add these features is more costly, less efficient, and effective.

BARRIERS

This section examines the barriers to expanding green building practices as a whole, as well as improving choices of building materials and maximizing waste reduction, reuse and recycling of building materials. The information in this section comes mainly from our interviews and meetings with green building experts.

LACK OF AWARENESS

The barrier most commonly cited as limiting the expansion of green building practices was the lack of awareness of these practices among owners of buildings. In general, experts believe that because building owners do not ask for green buildings, the building industry does not provide them.

Experts also noted that developers, architects and contractors need better education about green building practices and materials. As noted earlier, market surveys also suggest that builders may underestimate the willingness of consumers to pay extra initially for green features in homes. Some also stated that critical customers of the building

Is demand really lacking?

As described in Chapter 2 of this report, several surveys report that members of the building industry consistently underestimate the demand for green buildings. Since the experts interviewed for this study are all members of the building industry, it is possible that this bias is the reason why lack of awareness is the most commonly cited barrier. However, even if that is the case, increasing demand for green buildings can only help.

industry — such as real estate agents, lenders, appraisers, and local permitting officials — need to understand the value of green building.

RESISTANCE TO CHANGE

The building industry is a very conservative industry, and with good reason: architects, engineers, and contractors are liable for the buildings they design and construct. As a result, architects and contractors are reluctant to use materials or technologies that have not been tested and proven durable and effective. Likewise, owners, developers, and lenders prefer to use proven materials to protect their investments.

LEARNING CURVE

Systemic changes such as those required to shift to green building processes require motivated and dedicated individuals to implement them. These individuals must learn to implement the new design processes, and use new technologies and materials. Overcoming this learning curve is a large and potentially risky investment.

COST

Green building materials and practices often can cost more initially, due to smaller scale production, limited availability, more time-intensive processes, and other reasons. Sometimes green building practices cost more because economic actor sectors such as architects or contractors are unfamiliar with them, and need time to learn to use them. In particular, costs increase when green elements are shoehorned into a traditional building process. Because builders often operate on tight budgets, they are reluctant to use anything that may cost more.

Some information exists to suggest that green building does indeed cost more, at least upfront. The Packard Foundation conducted a study called the *Building for Sustainability Report* that describes six conceptual designs for its new office building in Los Altos, California. Each design was for a 90,000 square foot building meant to house 300 employees, with a three-level underground parking garage. These designs were on a spectrum that had a traditional office building (called “market”) at one end and a “living” building at the other. The report defines a “living” building as “having zero net annual impact on the environment from an operational standpoint.”⁴¹ The four scenarios in between are the four LEED™ ratings: Certified, Silver, Gold, and Platinum.

For each scenario, the report examined the following:

- Construction costs
- Effects on research, design, and construction schedules
- Costs of furniture, fixtures, and equipment
- Design and management fees
- Energy costs to run the building
- Reliance on the energy grid

⁴¹ Packard Foundation Facilities Steering Committee et al., 2002. *Building for Sustainability Report: Six Scenarios for the David and Lucile Packard Foundation Los Altos Project*. <http://www.packard.org/index.cgi?page=building>.

- External costs to society from the pollution associated with energy generation
- The Net Present Value of the building using 30-year, 60-year, and 100-year cost models. These are estimates of the costs in 2002 dollars of owning, operating, and replacing the building over those periods of time.

The table below summarizes the short-term costs for each scenario. The short-term costs include construction costs, cost of furniture, fixtures, and equipment, and design and management fees.

Table 4: Short-Term Costs of Green Building According to the Packard Building for Sustainability Matrix⁴²

Short-Term Costs	Market	LEED™ Certified	LEED™ Silver	LEED™ Gold	LEED™ Platinum	Living Building
Construction Costs	\$10.1	\$10.1	\$11.3	\$11.5	\$12.1	\$12.9
Furniture, Fixtures, and Equipment	\$1.3	\$1.4	\$1.5	\$1.6	\$1.6	\$1.7
Design and Management Fees	\$1.3	\$1.3	\$1.5	\$1.5	\$1.7	\$2.0
Total	\$12.7	\$12.8	\$14.3	\$14.6	\$15.4	\$16.6

Note: Costs are shown in millions of dollars.

As the table shows, the upfront costs of building green buildings are greater than those for building a traditional, or market, building. The upfront costs increase as the “greenness” of the building increases.

However, the long-term costs tell a different story. The table below shows the net-present values for each scenario at 30 years, 60 years, and 100 years.

Table 5: Net Present Values of Traditional and Green Buildings according to the Packard Building for Sustainability Matrix.⁴³

Net Present Values	Market	LEED™ Certified	LEED™ Silver	LEED™ Gold	LEED™ Platinum	Living Building
30 years	\$22.7	\$19.6	\$19.7	\$18.5	\$18.3	\$18.7
60 years	\$62.9	\$45.3	\$36.7	\$27.8	\$23.7	\$19.6
100 years	\$348.9	\$218.4	\$166.9	\$95.8	\$62.2	\$20.8
Total Savings over Market after 30 years	\$ -	-\$3.1	-\$3.0	-\$4.2	-\$4.4	-\$4.0

Note: Net present values are shown in millions of dollars.

The Packard Foundation and its partners discovered that building an office building even just to the LEED™-certified level would save them an estimated \$3.1 million dollars over thirty years. The savings would be even greater over 100 years – an estimated \$130 million.⁴⁴

However, developers, architects, and contractors are not interested in the life-cycle costs of a building, because they cease to be involved with a building once it is built. None of the life-cycle savings accrue to them. Also, budgets for construction and capital costs are often completely different than operating and maintenance costs, so construction

⁴² <http://www.packard.org/pdf/2002Matrix.pdf>

⁴³ <http://www.packard.org/pdf/2002Matrix.pdf>

⁴⁴ <http://www.packard.org/pdf/2002Matrix.pdf>

decision-makers have no way to consider life-cycle costs. Furthermore, leases often are structured such that tenants do not reap the benefits of operational cost savings. Therefore, the fact that, as the Packard report indicates, green buildings do cost more upfront is likely to continue to be a barrier to spreading these practices.

CODES AND SPECIFICATIONS

Many experts expressed frustration that even in progressive jurisdictions, building codes sometimes do not allow the use of green materials and technologies. This situation is a significant barrier, because either the architect or the contractor must take the time to explain the material or technology, provide engineering drawings, or otherwise convince the building code officials that the material or technology is safe to use. In the building industry, time is money, so only very committed builders will invest their time in this fashion.

Similarly, experts cited the lack of specifications for green building materials as a barrier to expanded use of these materials.

DESIGN OF BUILDINGS

A number of experts interviewed for this study were exasperated by building designs that maximize, rather than minimize, waste. For example, one expert described a recent design she had seen that called for 12-foot walls using 8-foot sheetrock. Redesigning these walls so that they better accommodate the available lengths of sheetrock would reduce waste, thereby saving resources at the outset. Traditional building practices do not consider this or other aspects of design for the environment, such as design for disassembly, design for flexibility, or design for worker productivity. As a result, buildings consume inefficient amounts of resources, are difficult to take apart or reuse, and contribute to employee health problems.

DESIGN OF MATERIALS

Similarly, some experts observed that many building products contain toxic materials, and/or are composed of substances that cannot be recycled easily. For example, treated wood often contains arsenic, chromium, or creosote. Others are composite products that cannot be disassembled for recycling or reuse, such as products made from a combination of wood fibers and plastic. These materials represent a significant barrier to achieving the Beyond Waste Vision because they thwart efforts to eliminate the use of toxic substances, reduce waste, and increase reuse and recycling.

One major obstacle to the development of alternative, green building materials is that there is no accepted definition of what constitutes a green building material. A set of criteria to define green building materials would help contractors, architects, consumers and others select materials that truly contribute to the Beyond Waste Vision.

AVAILABILITY OF MATERIALS

Some experts noted that it can be difficult to find green building materials, especially from local suppliers. Many builders have long-standing relationships with particular suppliers, so if those suppliers don't carry the green materials, builders are unlikely to expend the extra time and money to find them. Also, some green materials are not produced locally, forcing builders to order them from long distances at increased

transportation costs, which reduces and potentially negates their environmental advantages.

RECYCLING INFRASTRUCTURE

Experts cited several infrastructure barriers to increasing recycling of construction and demolition debris. In western Washington, experts said that there are too few transfer stations for construction and demolition debris. In addition, many of the stations are in Seattle, reducing the likelihood that contractors working outside the city will battle the traffic to recycle debris, when it would be faster simply to dispose of the material.

In eastern Washington, experts cited a lack of processing facilities for construction debris, especially concrete and gypsum, as a major barrier to increased recycling. Concrete and gypsum are heavy, high volume materials, making it costly to transport them great distances. Because these materials must be sent to Seattle or other distant places for recycling, it is often more cost-effective to dispose of them. Experts in eastern Washington also said that tip fees for disposal are too low, making recycling even less attractive. Although no western Washington experts interviewed for this study mentioned lack of processing capacity or low tip fees as barriers to expanding recycling, these issues may be factors in certain areas, particularly those distant from processing facilities.

One other barrier to recycling is that few facilities can process demolition debris that contains toxins. As a result, these materials end up in landfills.

LIMITED MARKETS

When asked what they thought was needed to increase innovation in green building materials, many of the experts interviewed for this study said that improving markets for recycled-content, less toxic, or otherwise green materials would stimulate this type of entrepreneurship. If entrepreneurs – or established manufacturers – were assured of reliable feedstocks and buyers for their products, they would be much more likely to invest the time and money in research and development necessary to generate and test new building products. Likewise, if processors were assured that manufacturers would buy their products, more facilities to recycle building materials would be built. Removing this barrier also would help divert recyclable materials from low value uses, such as the burning of wood waste as hog fuel, to higher value uses, such as using wood waste to create particleboard.

As this section illustrates, the barriers to achieving the Beyond Waste Vision for green building are many. Among these, the experts interviewed for this study most commonly cited lack of awareness of green building practices and the additional cost of building green as the two most important barriers. However, overcoming all of these barriers will be integral to achieving the Beyond Waste Vision for green building. In particular, improving the design of buildings and materials will help ensure that the buildings of the future generate less waste, are non-toxic, and are easy to disassemble or reuse.

This chapter has described the economic actor sectors and critical customers of the building industry, as well as the leverage points for and barriers to expanding green building practices. This information is important background for the next chapter, which discusses tools that the State could use to operate on the leverage points to overcome the barriers and foster green building in Washington.

4. Tools

This volume describes a variety of tools that the State could use to push on the leverage points and remove the barriers outlined in Chapter 4.

For each tool, we discuss the feasibility, cost-effectiveness, projected outcome, key challenges and success factors. Political feasibility, practical feasibility, and cost-effectiveness are treated as criteria and received rankings of high, medium, or low. Projected outcomes, key challenges, and success factors are treated as important information about each tool and received qualitative descriptions.

It is important to note here that green building still is a young and emerging discipline. Other jurisdictions that are engaged in green building have only just begun these programs. As a result, very few studies of the effectiveness or costs of green building tools exist. Therefore, the assessment of tools that is presented in this chapter is highly qualitative, and is based upon the consultant team's best professional judgment and our experience with the use of similar tools in other applications.

For the purposes of this study, these criteria and descriptors were defined and applied as follows:

Evaluation Criteria and Descriptors

- Political feasibility
- Practical feasibility
- Cost-effectiveness
- Projected outcome
- Key challenges
- Success factors
- Performance measures

- **Political Feasibility.** This criterion included such factors as the likelihood of political opposition from lobbyists or special interest groups, and the degree of difficulty of ensuring that funding for a tool is included in the appropriate budget.
- **Practical Feasibility.** This criterion focused on the technical aspects of adopting or using a tool, such as whether the expertise or technology exists to implement it.
- **Cost-effectiveness.** This criterion judged whether the cost of employing a tool outweighed the benefits that the State and the public are likely to receive from its use.
- **Projected Outcomes.** For this descriptor, we listed the likely results of applying each tool.
- **Key Challenges.** Items outlined under this descriptor include obstacles that the State is likely to face when employing each tool.
- **Success Factors.** These items are strategies, such as forming partnerships or effective lobbying, that the State should consider using to increase the likelihood that each tool would be successful.
- **Performance Measures.** These items are actions that the State can take to gauge the effectiveness of each tool over time.

The tools are organized into four categories:

- **Lead by Example.** This group includes ways that the Washington State government could expand green building through changing its own current practices. This group primarily addresses the lack of awareness, resistance to change, and codes and specifications barriers.
- **Educate.** This category includes developing educational programs for consumers and industries, and that would work to overcome the lack of awareness and resistance to change barriers.
- **Create Incentives.** This class of tools comprises ways that the State could make green building more attractive to a variety of economic actor sectors and critical customers. For the most part, these tools would help to surmount the cost and resistance to change barriers.
- **Create a Tool Box.** This group consists of ways that the State could make green building easier to accomplish, thus increasing the likelihood that these practices will spread. These tools would work to overcome the following barriers listed in Chapter 3: codes and specifications, resistance to change, and cost.
- **Develop Legislative and Infrastructure Tools.** This category discusses strategic partnerships that the State could forge in order to make green building more economically viable, primarily through infrastructure improvements and legislation. This group of tools would help to address the cost, availability of materials, recycling infrastructure, and limited markets barriers.

These tools are designed to take advantage of a variety of leverage points and operate on different combinations of economic actor sectors and critical customers.

LEAD BY EXAMPLE

This category of tools contains actions that the State can take to make the government of Washington State a leader in green building. These tools capitalize on the government's clout as a major force in the marketplace as well as its mandate to protect the public health and safety. The experts interviewed for this study cited these types of tools as among the most important steps that the State could take to foster the spread of green building practices.

TOOL #1: REQUIRE LEED™ CERTIFICATION FOR NEW STATE BUILDINGS

The State could work with the Washington State Legislature to establish a requirement that all new buildings constructed to house state government functions must be built to LEED™ standards after a certain date, such as January 1, 2005. Because there are several levels of LEED™ certification, the State could choose to require its new buildings to meet Silver standards at the outset, and then transition to the Platinum level by 2015.

Political feasibility: The political feasibility of requiring LEED™ certification for new State buildings is quite high, especially for a phased approach. In 2002, the Legislature created the Joint Task Force on green building, which has until January 2003 to present

its findings to the Legislature.⁴⁵ According to one of the members interviewed for this study, the Task Force is considering recommending that the State adopt LEED™ for new buildings. Given that the Legislature already is investigating the feasibility of requiring LEED™ certification, the time seems ripe for this action.

Practical feasibility: The practical feasibility of this tool is also high. A wide variety of jurisdictions around the country, including the City of Seattle, the City of Portland, the federal General Services Administration, and the State of Maryland require LEED™ certification for new buildings.⁴⁶ The experiences of these jurisdictions can provide useful models for Washington State. For example, the Cities of Portland and Seattle each have created modified versions of LEED™ that reflect local regulations and priorities; the State of Washington could consider doing the same.

Cost-effectiveness: The cost-effectiveness of this tool also would be high. The costs of requiring LEED™ certification for State buildings include the marginal increases to the costs of construction due to the standards, and the staff time necessary to implement the standard and provide any technical assistance the State wishes to provide. However, the effects of implementing the LEED™ standards include lower life-cycle costs for State buildings.

Projected outcomes: When compared to their traditional counterparts, buildings built to LEED™ standards have lower energy and water bills, lower maintenance costs, and may improve employee productivity.⁴⁷ Although more work needs to be done to establish the effects of green buildings on employee productivity, even a 1% increase in employee productivity would have significant economic benefits to the State. Other beneficial effects include reduction of waste disposed in landfills, use of less toxic products, and improved markets for salvaged, local, and recycled materials.

However, the projected outcomes do not stop there. A raft of additional benefits would result from this tool, including convincing developers, architects, engineers, contractors, tradesmen, and waste management companies that wish to compete for state projects that they must learn and employ these new techniques. This education process builds additional capacity within the building industry for creating green buildings, thus overcoming the lack of awareness, tradition, and perception – and sometimes reality -- of higher cost barriers cited in Chapter 3. It also would raise awareness of green building practices among the general public, again corroding the lack-of-awareness barrier. With additional education on this topic, members of the public may begin asking

What is the Joint Task Force?

In 2002, the Washington State Legislature created this task force to examine local green building programs and codes to answer questions including the following:

- Which components of green building codes and programs are effective?
- What are the incentives for green building?
- How can sustainable building complement the state's infrastructure needs (such as roads, stormwater, etc.)?

The ten task force members represent state and local government, the building industry, and environmental organizations.

Also in 2002, Governor Locke issued Executive Order 02-03, which exhorts cabinet agencies to develop Sustainable Practices Plans by September 1, 2003.

⁴⁵ <http://www.usgbc.org/Chapters/Cascadia/details.asp?ID=108>

⁴⁶ Information from a list prepared by the US Green Building Council, entitled *LEED Users Summary*. Note that these jurisdictions require different levels of LEED™ certification and some, like Seattle, have minimum square-footage thresholds.

⁴⁷ Morton, Steven. "Business Case for Green Design." *Building Operating Management*, November 2002. <http://www.facilitiesnet.com/bom/Nov02/Nov02environment.shtml>

for green buildings, thus creating the demand so often cited by the experts interviewed for this study.

Key challenges: The key challenges to employing this tool are the likely opposition to this requirement in the Legislature, and the ability of the State to allocate staff time to changing the applicable codes, and perhaps creating a modified version of LEED™ for Washington State. The State also may wish to provide some staff time for technical assistance to those who win contracts to build State buildings. Because LEED™ certification does involve some upfront costs, legislators may be less willing to adopt these standards. However, the momentum in the Legislature seems to be in favor of adopting some version of LEED™, so this challenge may be less formidable. The State also already has one FTE at The State dedicated to green building programs, but would need additional staff with technical expertise to support an effective technical assistance program.

Success factors: Success factors for this tool include a coordinated lobbying effort in the State Legislature. Support from the building industry would be ideal; the Master Builders Association of King and Snohomish Counties is already involved in the Built Green™ program and may be a logical ally. Additional support could be found among other governments that have adopted LEED™ standards, such as the City of Seattle, the State of Maryland, and the federal General Services Administration. Other partners may exist, such as state universities with architectural programs. Ensuring that the Legislature understands that building to LEED™ standards would result in long-term savings would be an important part of any lobbying effort.

Performance measures: Measures of the success of implementing this tool could include the following:

- Track the numbers of State buildings constructed to LEED™ standards over time.
- Measure employee productivity before and after occupying LEED™-certified buildings. Examine retention rates, use of sick leave, absenteeism, and job satisfaction, perhaps through employee interviews.
- Calculate the amount of waste reduced and diverted through State construction projects.
- Track energy and water savings that accrue from LEED™-certified buildings.
- Calculate the reduction in other operating costs, such as landscape maintenance.
- Track the number of subsequent green projects that developers, architects, engineers, contractors, tradesmen, and waste management companies undertake after working on a State LEED™-certified project.

Who else requires LEED™?

- Seattle, WA
- King County, WA
- Portland, OR
- State of Maryland
- US General Services Administration
- Austin, TX
- Boulder, CO
- Los Angeles, CA
- San José, CA
- San Mateo, CA

Which states are thinking about it?

- California
- Connecticut
- Massachusetts
- Pennsylvania

Which states use and encourage it?

- Arizona
- Missouri

TOOL #2: AMEND STATE PURCHASING REQUIREMENTS

The State has tremendous purchasing power, and can use it to improve markets for green building materials. This tool asks the State to update its purchasing requirements regularly to ensure that green building materials are purchased for projects ranging from new buildings to renovations to road and other infrastructure construction or repairs. However, one obstacle remains: there are no agreed-upon criteria for what constitutes a green building material. In order for this tool to be effective, the State would have to either design its own set of criteria, or work regionally or nationally to help institute one.

Political feasibility: The political feasibility of this approach is medium. Although few individuals or organizations would argue against the benefits of using green building materials, these materials sometimes are more difficult to find than traditional building materials. Therefore, contractors may resist having to use them, at least initially.

Practical feasibility: Practically speaking, the feasibility of identifying green building materials is low until criteria for selecting green building materials are in place. Once these criteria are chosen, however, the practical feasibility will be medium to high, depending on how easy it is to obtain the information necessary to determine whether a building material is green.

Cost-effectiveness: The cost-effectiveness of this tool is high. Although some staff time will be necessary to determine whether building materials meet the State's criteria and green materials may cost more up front, the State may save money over the life of products because they likely will be easier to reuse or recycle. Also, the creation of stable markets for green building materials is of high value to the State.

Projected outcomes: The expected outcome of requiring State agencies to purchase green building materials is that markets for these materials will improve, perhaps leading to increased private-sector investment in producing them.

Key challenges: The primary challenge to implementing this tool would be industry opposition due to the perception or reality that some materials are more difficult to obtain or fail to meet minimal functional standards.

Success factors: The key to success for this tool would be to develop clear, comprehensible criteria for green building materials and perhaps to provide some technical assistance in procuring them.

Performance measures: Performance measures for this tool could include the following:

- Track changes in the State's purchasing of environmentally responsible building materials. This data could be collected through Department of Revenue.
- Track private sector investment in producing green building materials before and after the requirements are implemented.

TOOL #3: REQUIRE ALL RENOVATIONS OF STATE-LEASED SPACE TO BE LEED™-CERTIFIED

This option takes LEED™ certification to the next step: requiring all renovations of State-leased space to be done to LEED™ standards. In addition, the State could require all State-leased space to be certified after a certain date. For example, the State may select a date that is ten years after the date that the requirement for new buildings to be certified takes effect.

Political feasibility: The political feasibility of this tool is medium in the short term, but may be at high in the long term. In the short term, members of the Legislature may object because of the perceived or real additional costs of conforming to LEED™ standards. In addition, building owners may resist this requirement. However, as time passes and the benefits of the LEED™-certified spaces – including lower operating costs and potential increases in employee productivity -- become apparent, the willingness of the Legislature to incur these upfront costs may increase.

Practical feasibility: The practical feasibility of this tool is high. The US Green Building Council has published a pilot version of LEED™ for existing buildings, called LEED™-EB, and is testing it on a selection of projects. If the State chooses to require all of its space to be LEED™-certified by a certain date, a phased approach with a distant time horizon would give building owners sufficient time to acquire the knowledge necessary to upgrade their buildings to LEED™ standards.

Cost-effectiveness: The cost-effectiveness of this tool is high. Because the State will need to renovate its existing leased space over time, implementation of this standard would require only a modest marginal investment.

However, the marginal benefits of this tool also are fairly high, especially if green buildings do increase employee productivity. In addition, the State receives the same benefits as those occurring from requiring LEED™ certification for new buildings: education of the building industry, education of consumers, waste reduction, recycling, and conservation of resources such as air, water, and energy. This tool would educate the remodeling sector, a different facet of the building industry that would not necessarily benefit from the implementation of LEED™ standards for new buildings. Given that over a third of non-residential construction and demolition debris generated nationwide is from renovation, and nearly sixty percent is from demolition,⁴⁸ educating remodelers and demolition crews should be a high priority for the State.

Projected outcome: The expected outcome of implementing this tool would be that all State-occupied space would be LEED™-certified, with all of the downstream benefits associated with that standard. Implementing this tool also would firmly establish Washington State as a leader in the green building field, ahead of all other federal, state, and local jurisdictions in the country.

Key challenges: The key challenges to using this tool are overcoming political opposition and the tight State budget.

⁴⁸ Franklin Associates, *Characterization of Building-Related Construction and Demolition Debris in the United States*, prepared for EPA, 1998.

Success factors: Key success factors include waiting a year or two to use this tool, so that the benefits of LEED™ certification can be proven, and, with luck, the economy recovers. The State may wish to partner with the Master Remodelers Association to lobby for this tool.

Performance measures: Performance measures for this tool may include the following:

- Measure employee productivity before and after buildings are renovated to LEED™ standards.
- Calculate energy and water savings after renovation.
- Track the number of remodelers who undertake subsequent LEED™-certified renovation projects after working on a State project.

TOOL #4: MODIFY THE STATE BUILDING CODE TO ACCOMMODATE GREEN BUILDING PRACTICES⁴⁹

Washington State maintains a statewide building code called the State Building Code (SBC) that is the minimum standard that all buildings constructed or renovated in Washington must meet. A group called the Washington State Building Code Council is in charge of the code, and updates it every three years.⁵⁰ Local jurisdictions can and do modify the code to adjust to local priorities and constraints, but cannot make the code less protective of public health and safety. In the interviews conducted for this study, green building experts commonly voiced frustration that even when builders want to include green materials or technologies, the building code sometimes prevents them from doing so. However, the experts did not provide specific examples of instances where this occurred. The State could partner with the State Building Code Council to modify the SBC such that it accommodated green building practices and technologies while maintaining high standards for public health and safety.

Political feasibility: The political feasibility of this tool is medium to high. Although building code officials may resist change, building industry representatives should support it. The key to this tool is that it modifies the code to *accommodate* green building, not to require it. Keeping this flexibility in the code will increase support for the changes, as well as foster innovation in building materials, technologies, and practices.

Practical feasibility: The practical feasibility is medium. For some materials and technologies, the information necessary to write the changes in the code is already available or could be generated easily. Other materials and technologies may need to be tested and proven.

Cost-effectiveness: The cost-effectiveness of this tool is medium. There are upfront costs associated with changing the code, including staff time to work with the State Building Code Council to find the places that need changes, make the alterations and gather the necessary information. However, the benefits include increased ability to implement green building practices, and decreased frustration among the building industry, which should not be underestimated.

⁴⁹ Although this tool and Tool #5 could be considered regulatory tools, they are included in this category because they concern State actions and regulations and therefore help the State to lead by example.

⁵⁰ <http://www.sbcc.wa.gov/>

Projected outcome: The projected outcome of this tool is that green building will become easier statewide. Builders would not be stymied by codes that favor traditional practices, and would be more willing to try new materials and practices. Entrepreneurs may be more willing to experiment with creating new materials that meet the standards in the code.

Key challenges: The challenges associated with this tool are the potential unwillingness of the State Building Code Council to make changes to the code, and the lack of information about some materials and practices.

Success factors: To succeed in implementing this tool, the State should strive to form partnerships with the Council, and with building associations such as the Master Builders Association and manufacturers to build support for the changes and produce the required documentation.

Performance measures: Potential performance measures for this tool include the following:

- Set up a system for tracking instances where provisions in the building code thwart the use of a green building material, practice, or technology. The number should decrease over time.

TOOL #5: ENSURE STATE REGULATIONS ACCOMMODATE GREEN BUILDING PRACTICES

One of the experts interviewed for this study mentioned an instance where other regulations besides the State Building Code prevented the use of a green building practice, material, or technology. She said that stormwater regulations had prevented one builder from using a rainwater capture system that would have used the rainwater onsite rather than sending it through the stormwater system. This tool would attempt to prevent similar future barriers by examining other state regulations, such as zoning and land use laws, to find places where they prohibit green building practices, and altering those regulations so that they allow green building practices but still maintain the same (or increased) protection of public health and safety. These regulations also should be examined to find outright disincentives to green building practices and materials, and altered to accommodate or even encourage them.

Political feasibility: The political feasibility of this tool is medium. Resistance to change always exists, but if the State can show that the changes are beneficial and do not relax other standards, it should be possible to make the changes.

Practical feasibility: The practical feasibility of this tool also is medium. The first potential difficulty associated with this tool is identifying those places in the myriad of State regulations that prohibit or inhibit green building. To avoid spending great amounts of staff time searching for places in the code that are disincentives, the State may wish to rely upon reports of barriers. Once these places are found, the State or its partners must then find the information necessary to make the changes. However, if the information is readily available, then the changes should be fairly simple to make. The Beyond Waste partners may wish to consider waiting to act until a large number of barriers have been reported, so that changes can be made holistically in a rule revision process.

Cost-effectiveness: The cost-effectiveness of this tool varies depending upon the severity of the barrier to green building that each regulation may represent. As barriers increase in severity, the cost-effectiveness of finding ways to remove them should increase.

Projected outcome: The projected outcome of this tool is that green building materials, practices, and technologies would be somewhat easier to implement. Like the changes in the code, these changes would result in some increased satisfaction among the building industry and some environmental benefits.

Key challenges: The challenges associated with this tool are the difficulties in finding the appropriate places in the code that need to be fixed, and locating the information necessary to fix them.

Success factors: The success factors for this tool could include working with the building industry to identify these places and to gather the necessary information.

Performance measures: Performance measures for this tool include the following:

- Set up a system to track instances where other state codes prohibit or inhibit the use of green building practices, materials, and technologies. The number should decrease over time.
- Set up a system to track whether other codes allow use of alternative systems or materials and evaluate their successes. The number should decrease over time.

TOOL #6: MANAGE NATURAL CAPITAL SUSTAINABLY

This tool calls for the Washington State Department of Natural Resources to require that products harvested from state lands be extracted sustainably. For example, timber harvests from state lands should be certified as consistent with the Forest Stewardship Council's (FSC) principles and criteria. These principles and criteria emphasize social, economic, and environmental goals, and are designed to promote sustainability. Washington State manages 2.1 million acres of forestlands⁵¹; certification of State forests would increase the certified acreage in Washington by 18 percent.⁵² The purpose of applying this tool would be to lead by example, thus encouraging other landowners to adopt such methods, to make locally extracted sustainable products available in Washington, and to demonstrate that sustainable practices can be economically viable. Once the sustainable management of state forests proves to be a success, the State can work toward managing other state resources, such as sand and gravel, sustainably.

Political feasibility: The political feasibility of this tool is medium. According to a recent report prepared for the Certified Forest Products Council, the timber industry resists outside oversight and certification of its practices.⁵³ Given that the timber industry is still a powerful force in Washington State, this tool likely would encounter opposition in the State Legislature. However, creative solutions are possible: for

⁵¹ <http://www.wa.gov/dnr/htdocs/fr/sales/sustainharvest/sustforestry.pdf>

⁵² Cascadia Consulting Group, 2002. *Expanding Markets for Certified Forest Products in the Pacific Northwest*. Report prepared for the Certified Forest Products Council.

⁵³ Ibid.

example, the State could implement joint certification programs involving both an industry-preferred standard and the FSC standard. In addition, environmental groups and green building associations, such as the Northwest Eco-building Guild and the Cascadia Chapter of the U.S. Green Building Council, are likely to support the use of forest certification and the application of sustainable practices to other natural resources.

Practical feasibility: Practically speaking, the feasibility of this tool varies depending upon the material. For forest products, the feasibility is high because standards for certification, as well as bodies accredited to certify them, already exist. However, according to the Forest Stewardship Council's website, only two organizations in the United States are accredited to certify forests: Scientific Certification Systems, based in California, and the Smart Wood Program, based in Vermont. One additional body, the Silva Forest Foundation, is located in Canada.⁵⁴ This relative dearth of accreditation bodies may prove to be a bottleneck in the short-term, but not over the Beyond Waste timeframe of 30 years. Also, certification programs for other natural resources, such as sand and gravel, may need to be created.

Cost-effectiveness: The cost-effectiveness of this tool is uncertain. Developing standards for other natural resources besides forest products will require resources, and depending upon the status of current harvest practices, improving them to meet certification requirements will require additional resources. However, if these resources could be found and applied, Washington State could guarantee a supply of certified wood and other sustainable products, thus making green building easier to accomplish here.

Projected Outcomes: The projected outcomes of managing state forests and other natural capital sustainably are increased supplies of certified wood products and other sustainable building materials, as well as the other environmental, social, and economic benefits that result from sustainable management of natural resources.

Key challenges: The major challenges associated with this tool are overcoming potential industry opposition and ensuring that harvest and extraction practices meet certification standards.

Success factors: The primary key to success is finding an effective method of supporting the Department of Natural Resources as it continues down the path to certification. Early success with sustainable wood products will make expanding these practices to other materials simpler. Forging partnerships with industry well as environmental and green building groups in Washington also will help ensure the success of this tool.

Performance measures: Performance measures for this tool include the following:

- Track demand for State forest products before and after certification.
- Track the use of the certified wood credit in LEED™-certified projects in Washington State before and after State forests are certified.
- Track the rate at which other landowners certify their forestlands before and after State certification.
- Determine whether sustainable management of natural resources leads to the extraction of increased value over time, and whether it creates jobs.

⁵⁴ <http://www.fscoax.org/principal.htm>

EDUCATE

This set of tools is designed to help the State address two barriers: the lack of awareness of green building practices, and the perception (and sometimes reality) that green building costs more than traditional building. The experts interviewed for this study emphasized the need for education of a wide variety of stakeholders in the building process, including building owners, architects, engineers, contractors, tradesmen, lenders, appraisers, and real estate agents. They also said that better information about the true costs and benefits of green building would help to make these practices more attractive to developers and building owners, thus increasing its acceptance. Each of these tools is described and assessed below.

It is important to note that education programs often are more effective if they are coupled with other tools such as incentive programs and/or regulations. These types of tools are described later in this chapter; the Action Plan presented in Chapter 5 recommends just such a combination of tools.

TOOL #7: CONSUMER EDUCATION

For the purposes of this discussion, the term “consumers” includes homeowners and owners of commercial, institutional, and multi-family buildings. The State could develop an education program targeted to these consumers with the goal of increasing their awareness of green building practices and, thereby, their demand for green homes and green office buildings. This program should highlight the lower operating costs and improved indoor air quality associated with green homes and office buildings, not just the environmental and societal benefits of green building. That way, green buildings will appeal to those who are not necessarily environmentalists.

The State should consider partnering with existing green building groups, such as the Cascadia Chapter of the US Green Building Council, the Northwest Eco-building Guild, and the participants in the Built Green™ programs that are springing up around the state. These associations can help refine the messages and methods used in the education campaign, and perhaps provide financial or other assistance.

Although it is beyond the scope of this project to design an education program, it is important to note that the program can be as big or as small as needed to be effective. One expert interviewed for this study recommended working with Oprah Winfrey to have green building featured on her show. Others suggested that the State conduct demonstration projects ranging from building model green buildings and leading tours through them to holding training sessions at retail stores to show homeowners how to use green materials. The State could run television, radio, or newspaper advertisements, or use more traditional educational materials such as brochures or pamphlets.

Political feasibility: The political feasibility of education programs is high, especially in the long term. Although no one objects to education programs, the present tight state budget may make those who control the State’s budget less inclined to approve large advertising expenses. In addition, managing education programs can be expensive.

Practical feasibility: Practically speaking, however, the feasibility is high. Innumerable private and public sector agencies manage education and advertising campaigns, so the

expertise to develop such programs exists. The State also can develop partnerships with other organizations, as discussed above, to both improve the content and delivery of the educational materials and possibly defray some of the costs of the program.

Cost-effectiveness: The cost-effectiveness of an education program depends on the scope and budget of the chosen program. Television, radio, and newspaper advertisements are expensive; brochures, flyers, and other print materials are less so but require delivery mechanisms, which can add to their cost. However, the benefits of such a program, if effective, would be quite high. Consumers would start requesting green homes from builders and developers, and green building materials from retailers, thus increasing the markets for both. A detailed survey of the target audiences to determine their preferred learning styles and information needs would help increase the effectiveness of education programs.

Projected outcome: As implied above, the expected outcome from this tool would be a stronger, deeper market for green buildings. These benefits could accrue for both homes and commercial buildings, because CEOs and building owners are consumers too.

Key challenges: The key challenges for this tool include identifying the appropriate target audience, message content, and ways to reach the audience, so that the State funds good programs that achieve results. Also, obtaining enough money to pay for education programs is a perennial problem, currently exacerbated by the State's budget crunch.

Success factors: Key success factors include working with other agencies and associations to develop a coordinated, effective program, finding ways to reduce the costs of the program, and demonstrating success to ensure continued support.

Performance measures: Performance measures for this tool include:

- Survey customers at retailers such as Home Depot and Lowe's to determine their knowledge of and demand for green building. Repeat over time.
- Survey building managers to determine their knowledge of and demand for green building.
- Survey visitors to model buildings to see if they implement sustainable building practices after their visits.

TOOL #8: ARCHITECT EDUCATION

This tool calls for the State to form partnerships with universities that provide architectural training to develop green building curricula. It also involves developing continuing-education classes for architects about green building materials, technologies, and practices. These courses should focus on designing buildings to minimize waste, use of environmentally responsible building materials, and creation of sustainable buildings. Ideally, architects will someday include green features in homes and office buildings the same way they include safety features – automatically. This tool would lay the foundation for that change.

In Washington State, the University of Washington and Washington State University both offer degrees in architecture. Green building is becoming more integrated into the

curriculum at the Pullman and Spokane campuses but is still an elective rather than a requirement, and it's offered only at the upper division and graduate level.⁵⁵ Although the University of Washington's website does not list any specific green building courses, elements of green building such as energy efficiency, ways to use natural light, and site selection are included in other courses.⁵⁶ Two community colleges, Spokane Community College and North Idaho Community College, are integrating sustainable building into their carpentry programs.⁵⁷ Workshops that teach architects to use the LEED™ certification system also exist.

According to the American Institute of Architects' website⁵⁸, Washington State does not require architects to take continuing-education courses. However, a growing number of states do have such requirements – Oregon requires 12 hours of Continuing Professional Education each year.⁵⁹ Even though Washington does not have continuing-education requirements, architects should be interested in keeping up with the latest trends in design and materials in order to stay competitive in the marketplace, including in Oregon and other states.

The State would not have to design these programs alone. A four-year project called Educating Architects for a Sustainable Environment (EASE) produced "recommendations, strategies, and models for curriculum reform in architectural education."⁶⁰ The State should consider building upon these recommendations and curriculum models to help foster the greening of architectural education in Washington State.

Political feasibility: If the State develops a successful partnership with the Washington State Chapter of the American Institute of Architects (AIA), the political feasibility of this tool is likely high. Without the support of the AIA, the architectural community probably would not find the programs worthwhile. The State also would need to find ways to partner with the universities.

Practical feasibility: The practical feasibility of this tool is high. The EASE project has developed models, as have institutions such as Washington State University, as described above. Therefore, the technical information and experience necessary to use this tool is already in place.

Cost-effectiveness: The cost-effectiveness of this tool is likely high. With a moderate amount of investment in terms of staff time and budget for materials, the State could help achieve a future in which green building is the rule rather than the exception, as architects use green design methods as a matter of course.

Projected outcome: The expected outcome is that described above: eventually, green design methods will become as natural as safety measures are today. Obviously, this outcome would emerge over time, as more architects are educated under this system.

Key challenges: Key challenges for this tool are finding ways to work effectively with partners such as the AIA and the universities, and to convince the universities and

⁵⁵ Jim Wavada, personal communication to Laura Blackmore, January 2, 2003, Seattle, Washington.

⁵⁶ http://depts.washington.edu/archdept/programs_courses/masters_prog/master_prof.html

⁵⁷ Jim Wavada, personal communication to Laura Blackmore, January 2, 2003, Seattle, Washington.

⁵⁸ <http://www.aia.org/conted/>

⁵⁹ http://www.architect-board.state.or.us/faq_cpe%202.htm#1

⁶⁰ <http://www.bsu.edu/cap/ease/>

practicing architects that this information would add value to their programs and resumes.

Success factors: The key to success for this tool is to forge partnerships with the AIA and the universities, as mentioned above. These partnerships may also help to defray some of the costs of the program.

Performance measures: Performance measures for this tool include:

- Survey Washington State universities that offer architectural training periodically to determine how green building practices are presented in their curricula. Monitor the rate at which green building practices are presented as a matter of course rather than as a special, extra step.
- Track attendance at green continuing-education programs for architects. Compare to total number of architects licensed in Washington.
- Survey architects periodically to determine how many have integrated green building practices into their normal routine. Compare those that participated in these programs to those that did not.
- Track the number of architects and other professionals who become LEED certified

TOOL #9: CONTRACTOR EDUCATION

This tool has two primary facets: educating contractors about green building practices in general, and educating them about jobsite recycling and waste management practices specifically. From a Beyond Waste perspective, the green building education also should cover materials that are environmentally benign, such as those that incorporate no toxic substances. These programs should describe how to handle green materials, where to get them and what their benefits are. Some experts recommended holding training sessions at the places where contractors buy building supplies, so that the contractors would know that a trusted supplier carried these materials and they would not have to go out of their way to find them. Such training would begin to counter the barriers of lack of awareness of green building practices, and the tradition inherent in the building industry.

Many experts interviewed for this study mentioned that one of the key ways to increase jobsite recycling would be to educate contractors about the cost-savings usually associated with recycling, and the services available to them in their area. Also, contractors need to understand that they must train every person in their crews, or assign one specific person, to handle wastes appropriately, especially if source-separated recycling is the only option available.

Political feasibility: The political feasibility of this tool is high, particularly if the State can forge partnerships with professional associations such as the National Association of Home Builders, the Master Builders Association, or the Association of General Contractors, and local governments. Like the architectural education tool above, industry participation is critical to avoiding the perception of government interference. If the State chooses to hold training sessions at materials supply stores, the department also will need to create partnerships with these stores.

Practical feasibility: The practical feasibility of this tool also is high, as the State and some local governments have staff who are experienced at working with contractors and providing technical assistance, as well as designing educational materials and programs. The information about green building practices, green materials, and jobsite waste management practices also is already available.

Cost-effectiveness: The cost-effectiveness of this tool is high. For a relatively modest investment of staff time, the State could reap rewards including increased acceptance of green materials, improved waste reduction and recycling of construction and demolition debris, and elevated willingness to try new materials and techniques.

Projected outcome: As noted above, the expected outcomes of this tool are improved contractor acceptance of green building practices and materials, and increased participation in jobsite waste reduction and recycling programs. As with the architectural education tool above, these outcomes would emerge over time.

Key challenges: The key challenges to the success of this tool are finding ways to make the education intriguing and relevant to the contractors so that they will attend sessions, read materials, and otherwise participate, and then incorporate the information into their practices.

Success factors: The key to success is forging partnerships with industry groups, which can both assist with development of effective programs and increase the chance that contractors perceive the programs as credible.

Performance measures: Performance measures for this tool include:

- After education programs have been developed and implemented, survey contractors who have participated and those who have not to determine the level of their green building knowledge, and compare their levels of awareness.
- One year after educating contractors about jobsite recycling, visit their jobsites to see which practices are still being followed.
- Monitor construction and demolition generation, recycling, and disposal rates.

TOOL #10: PRODUCTION HOME DEVELOPER EDUCATION PROGRAM

Production homes are those that are built in great numbers over a short period of time, in developments such as Redmond Ridge in King County. This tool calls for educating the developers of such production homes about green building practices so that the thousands of homes that are built this way annually in Washington State will be built green.

Political feasibility: The political feasibility of this tool is high, particularly if the State can forge partnerships with professional associations such as the National Association

of Home Builders or the Master Builders Association. Like the other education tools above, industry participation is critical to the perception of programs as credible. Ideally, the State should enlist production developers that already build green, such as Quadrant or Port Blakely Communities, in developing and promoting this program.

Practical feasibility: The practical feasibility of this tool also is high, as the State has staff that are experienced at designing educational materials and programs. The State also can work with production developers who already are building green to develop case studies or other information.

Cost-effectiveness: The cost-effectiveness of this tool is high. For a relatively modest investment of staff time, the State could receive the benefit of hundreds of homes at a time being built green.

Projected outcome: As noted above, the expected outcome of this tool is a dramatic increase in the number of homes that are built green statewide.

Key challenges: The key challenge to the success of this tool is finding ways to make the business case for building green to production developers. The developers must be able to recoup any additional costs necessary to build green homes.

Success factors: The key to success is forging partnerships with industry groups and production developers who already build green, which can both assist with development of effective programs and improve the chance that developers perceive the programs as credible.

Performance measures: Performance measures for this tool include:

- Track the number of production developers who switch to green building practices after receiving this education.

TOOL #11: DEVELOP INFORMATION ABOUT COSTS AND BENEFITS OF GREEN BUILDING

One of the main barriers to spreading green building that the experts cited was the perception that green building costs more. As a result, developers, architects, and contractors, as well as the owners who are their customers, don't explore green building. The experts recommended that the State compile solid information about the costs and benefits of green building and share it widely in order to combat this perception.

As discussed above in Chapter 3, some of this information exists already. The David and Lucile Packard Foundation's report indicates that while upfront costs for constructing green office buildings may be higher, the lifetime costs of owning and operating green buildings may be significantly lower than for their traditional counterparts. Similarly, initial extra costs in residential construction may be recovered over the life of buildings through reduced energy costs. However, the Packard report represents only one study, and even less is known about the costs and benefits of green homes. The State may wish to support national studies of traditional and green homes and office buildings to compare the upfront and lifecycle costs, and make that information available.

Tools also exist for estimating energy savings. For example, the Department of Energy has created a model called DOE-2 that calculates the amount of hourly energy use of a

home or commercial building.⁶¹ The State could apply the model to green home designs and publicize the findings.

It is important to note that this type of information would be particularly effective with building owners, such as homeowners, building management companies, or the Washington State government. It will not be particularly effective with developers who build on spec, architects, or contractors, because none of the lifecycle savings accrue to them under the current system. The section on incentives discusses some ways to make green building more financially attractive to these groups.

Political feasibility: The political feasibility of this tool is high, particularly with industry participation. The State has long served as an information broker, and there usually is very little resistance to this role.

Practical feasibility: Practically speaking, the feasibility is also high. The tools exist to conduct these types of analyses of buildings; the State simply must find homeowners or developers who are willing to let the State study their buildings.

Cost-effectiveness: The cost-effectiveness of this tool should be high. Although the studies will cost some money to conduct, the effect of increasing demand for green building practices among building owners should outweigh that cost.

Projected outcome: The expected outcome of this tool is that this type of information will bolster the case that green building is as good for the traditional bottom line – economics – as it is for the emerging bottom lines of society and environment. Credible information along these lines should help to increase demand for green building.

Key challenges: The key challenges for this tool will be finding buildings to study, and deciding upon the appropriate methods for conducting these studies.

Success factors: The key success factors for this tool will be forging partnerships with building owners, and spreading the resulting information widely enough that it has maximum effect.

Performance measures: Performance measures for this tool include:

- After information has been developed and disseminated, survey owners of green buildings to determine how much the information about costs and benefits influenced their decision to buy a green building.

⁶¹ <http://gundog.lbl.gov/dirsoft/d2what.html>

CREATE INCENTIVES

This set of tools addresses four important barriers to green building: lack of awareness, perception of higher cost, design of buildings and materials, and the traditional nature of the building industry. These tools address these barriers through making it economically attractive for building owners, developers, architects, contractors, and tradesmen to build green buildings.

Some states have developed incentive programs, such as revolving loan funds, which are not constitutional in Washington State. Other states have developed some incentives, such as grant programs, that would need to function slightly differently if adopted in Washington State due to the constitutional prohibition of lending the state's credit to private individuals. The following tool discussions attempt to address these constraints and provide ideas for ways to make these tools work constitutionally in Washington.

TOOL #12: TAX CREDITS

As shown in Table 3 in Chapter 2, several states have instituted tax credit programs as an incentive to builders to build green. For example, the State of Maryland allows businesses that construct or remodel commercial, multi-family, or combined buildings that are 20,000 square feet or larger and that achieve a LEED™ Silver rating to deduct 6%-8% of the total construction costs from their tax bills.⁶² The State of New York allows builders who build green to deduct up to \$3.75 per square foot for interior work and \$7.50 per square foot for exterior work from their state tax bill.⁶³ These programs help overcome the cost barrier by allowing builders to benefit from building green even if the materials and design may cost more upfront.

The State could work with the Legislature to design a similar tax credit program. Because Washington State does not have an income tax, the State could explore ways to have the credit apply to other taxes, such as the sales tax associated with the sale of a green building or B&O taxes.

Such a tax credit program is likely to sunset after a period of five or more years. If Washington's tax credit program does sunset, the State will need to be vigilant to maintain builders' interest in green building without the tax credit.

Political feasibility: The political feasibility of this tool varies with the condition of the State budget, and with the tax chosen – for example, B&O taxes are politically sensitive. Incentives are extremely popular and taxes are very unpopular, so this tool should not encounter much opposition from industry or anti-tax interest groups. However, in lean times, any reductions in the state budget must come from cuts to other programs.

Practical feasibility: The practical feasibility of this tool is high. The upfront costs to the State involve staff time for lobbying the Legislature, and setting up a mechanism for handling the paperwork and other tasks associated with this tool. The experiences of New York and Maryland should serve as an effective model for Washington to follow, although these examples may need to be modified to fit Washington's tax code.

⁶² <http://business.marylandtaxes.com/taxinfo/taxcredit/greenbldg/default.asp>

⁶³ <http://www.nrdc.org/cities/building/nnytax.asp>

Cost-effectiveness: The cost-effectiveness of this tool depends upon how frequently it is used, and what other programs may suffer due to reduced funding. The more successful this tool is, the more expensive it will be. However, it is likely to be very effective at encouraging builders to incorporate green building practices.

Projected outcome: The projected outcome of this tool is that builders would be much more likely to pitch green building to their customers, more eager to learn about green building, and more excited about the program in general. This tool should be very effective at increasing the supply of green buildings.

Key challenges: Key challenges to this tool include the State's budget crunch, and the opposition expected from those whose programs may receive budget cuts due to the anticipated reduced tax revenue. Another challenge for the State is to figure out how to keep the momentum going after the tax credit program sunsets, as it likely will.

Success factors: The key success factors for this tool include rallying the building industry's support, making the credit enough to be worth the builder's while, and setting up an effective mechanism for processing associated paperwork.

Performance measures: Performance measures for this tool include:

- Track the number of builders who take advantage of this program.
- Survey builders who apply for the credit to determine how important it was to their decision to build green. Ask them if they would have built a green building without it.
- Once the tax credit sunsets, survey builders who applied for the credit in the past to determine whether they are still building green.

TOOL #13: MINI-GRANTS

Alameda County, California, runs a Mini-Grants program, which provides small amounts of money to any applicant who would use it for source reduction, recycling, reuse, and market development.⁶⁴ This program is not targeted at green building. However, the State of Washington could create a similar small grant fund that was aimed at reducing the costs of green building, particularly for homeowners (or their contractors) who wish to install energy-efficient appliances or remodel a room with salvaged materials. Because the state constitution limits extension of the state's credit, this program would need to be designed carefully to ensure it is legal. It may be possible for the State to partner with utilities to use this tool, since utilities legally can provide grants to individuals.

Political feasibility: The political feasibility of this program should be high, especially if the total amount available for the grants is not excessive and the staff time needed to manage the program is low. (For comparison, Alameda County has \$50,000 total available for this program in Fiscal-Year 2002-2003.) Utilities should be willing to consider such a program, since it helps them to achieve their conservation goals.

Practical feasibility: The practical feasibility of this program should be high, particularly if the application for the grant is simple to fill out and the program is well publicized.

⁶⁴ <http://www.stopwaste.org/m-grants.html>

Cost-effectiveness: The cost-effectiveness of this program is likely medium. Although the program would not cost much, it also would not provide tremendous gains in terms of increased demand for green building practices. However, if homeowners hire contractors to implement the changes, the contractors may incorporate these new practices into their future projects. Also, if homeowners allow the state to document their experience, the state could gain valuable information from the program.

Projected outcome: The expected outcome of this program is that a relatively small number of homeowners would apply for small grants to cover the inclusion of green materials in a renovation or in a new construction project. Thus, this program would increase demand for green building.

Key challenges: Key challenges associated with this program include publicizing it well enough that homeowners take advantage of it, and making the application simple.

Success factors: In addition to effective advertising and a simple application, the key to success of this tool is partnering with utilities to run the program

Performance measures: Performance measures for this tool include the following:

- Survey homeowners and contractors who apply for mini-grants to determine the importance of the grant in their decisions to build green.
- Ask them if they will continue to build green in the future, even without grants.

TOOL #14: REBATES AND DISCOUNTS

The State of Washington could implement programs to waive or rebate sales tax on green building materials, appliances, and services. Models for such programs exist, although they tend to focus on energy efficiency. For example, the State of Maryland implemented a program in 2000 that waives the state sales tax on a variety of energy-efficient appliances, photovoltaic or solar energy systems, and hybrid and electric vehicles. Maryland's program is in effect for a limited time only – in most cases, until July 1, 2004.⁶⁵

Political feasibility: The political feasibility of this program is medium. Although incentives are popular and sales taxes are unpopular, reducing the State's income during a time of budget crisis may be a difficult sell in the Legislature, especially since the beneficiaries – consumers – may be too diffuse a group to lobby effectively. However, if the program were time-limited, it may be more attractive to lawmakers.

Practical feasibility: The practical feasibility of this program is medium. Retailers and wholesalers have systems in place to exempt certain products from sales tax already, so it should be simple to add green building products to the list. However, finding ways to alter the tax codes effectively and efficiently may be somewhat of a challenge.

Cost-effectiveness: The cost-effectiveness of this program likely is high, although it depends upon how many consumers take advantage of it. However, a moderate cost to the state could result in a major increase in the demand for green building products.

⁶⁵ <http://www.energy.state.md.us/cleanincentives.html>

Projected outcome: The expected outcome of this tool is that the effective price of green building materials will be lowered relative to their traditional counterparts, likely resulting in cost savings for consumers and builders. These savings should increase the demand for green building products. In addition, the tool may provide an incentive for manufacturers to design new products so that they qualify for this program, thereby increasing design for the environment.

Key challenges: Key challenges associated with this tool include passage in the legislature and identification of appropriate products.

Success factors: Key success factors include a coordinated lobbying effort and good information about the net benefits of various green building materials upon which to base the selection of the products included in the law.

Performance measures: Performance measures for this tool include the following:

- Track purchases of the materials covered in the law for one year before the law goes into effect. Compare to purchases after the law is in effect, and after the law sunsets (if applicable).
- While the program is in effect, survey consumers who purchase the materials to determine the effect of the discount on their purchasing decision and their satisfaction with the products' performance.
- After the program sunsets (if applicable), survey consumers who continue to purchase the green materials to determine whether they first became aware of the products because of the discount, and to find out why they continue to purchase them.

TOOL #15: PERMITTING AND REGULATIONS

The intent of this tool is to make green building more attractive to developers and builders who are operating on tight timelines by streamlining regulatory processes such as the permit process. Many of the experts interviewed for this study said that the promise of faster permitting processes would be a strong incentive for builders to build green. Because local jurisdictions issue building permits, the State would need to partner with local jurisdictions to implement this tool. In addition, the State should partner with building industry groups to ensure that any changes to the permitting or other regulatory processes truly streamline the process and are true incentives to builders.

Every county with unincorporated area and every incorporated jurisdiction in Washington processes building permits. Therefore, the sheer number of local jurisdictions makes this a daunting tool. However, this tool should lend itself to implementation over time, and the State could smooth the path by developing a model code that allowed permitting incentives for local jurisdictions to adopt if desired, or conducting a pilot project.

Another option is to streamline the permits that the State issues, such as for stormwater.

Political feasibility: The political feasibility of this tool likely is low to medium, although it would vary by jurisdiction. Local building departments may not appreciate the State's interest in altering their practices. However, if the State proceeds carefully, it may be possible. Also, building industry support may be mixed – although builders are likely to

favor anything that speeds up the permitting process, those who are unwilling to try green building will resent having their projects passed over.

Practical feasibility: The practical feasibility of this tool is medium. As described above, the State could work with jurisdictions over time, rather than trying to do them all at one. Also, the State should be able to work with the Washington State Building Code Council to develop model language that would allow permit incentives.

Cost-effectiveness: The cost-effectiveness of this tool also is medium, although it depends upon the number of builders who take advantage of the program. The State would need to invest a moderate amount of staff time over a number of years to achieve benefits, which also would accrue slowly.

Projected outcome: The projected outcome of this tool is that some local building departments would create permit incentives for green buildings. In those areas, the supply of green buildings would increase.

Key challenges: Key challenges for this tool include the need to work with a large number of local jurisdictions that may or may not appreciate the State's interest in their procedures. In addition, builders of traditional buildings may oppose such measures.

Success factors: Key success factors include good relationships with local jurisdictions, the support of the building industry, and the development of effective mechanisms to truly streamline the permit process.

Performance measures: Performance measures for this tool include the following:

- Track the number of jurisdictions that implement streamlined permitting processes for green buildings.
- Survey builders who take advantage of the program to determine its effect on their decisions to build green.

TOOL #16: GRANT PROGRAMS

This tool has many possible permutations. The experts interviewed for this study suggested two types of grants that would stimulate green building practices:

- Grants for research and development of new green building materials and technologies; and
- Grants for start-ups, such as new deconstruction companies.

The State could set aside a portion of its budget to provide grants to entrepreneurs who have ideas for new materials or who wish to provide new services to expand the green building repertoire of Washington State. For example, the Beyond Waste partners could make grants available to those who wish to start deconstruction firms. As discussed in the introduction to this chapter, the State would need to design the program carefully to ensure its constitutionality.

Alternatively, the state could design a program in which the state hired a research and development company to investigate a new material or technology if the results, including any manufacturing processes, were made completely public. This strategy also should be constitutional, and should help to encourage the development of

environmentally responsible building materials. However, the State should consult the state attorneys general to ascertain that any program meets legal requirements.

Political feasibility: The political feasibility of such grant programs is high despite the State budget crunch. The State could market this program as one that would create jobs, especially for unskilled workers, and therefore one that would help the struggling economy. It also fosters the private sector rather than additional government programs.

Practical feasibility: The practical feasibility of these grant programs is medium. Although many agencies, including the State, run grant programs that could serve as model, constitutional constraints may affect this tool adversely. Some staff time to develop funding criteria and to evaluate applications also would be required.

Cost-effectiveness: The costs to the State of this program are medium, and the potential benefits – including increased availability of green building materials and services, as well as job creation – are high. Therefore this tool is cost-effective.

Projected outcome: The projected outcomes of this tool include increased innovation in green building materials, increased manufacturing capacity, and increased availability of services such as deconstruction in Washington State. In addition, this tool could help create jobs and provide skills to those who need them.

Key challenges: Key challenges for this program consist of marketing it effectively in the Legislature.

Success factors: Key success factors include ensuring that the program is legal, stressing the job creation and economic stimulation aspects of the program, and keeping it simple.

Performance measures: Performance measures for this tool include the following:

- Track the number of jobs created through these grants.
- Calculate the market share of materials and services developed under these grants.
- Measure the economic effects of these grants.
- Track the number of new materials developed using the grant funding, and the amount of environmental benefit received from using the new product rather than a traditional, more harmful one.

CREATE A TOOL BOX

This section describes ways for the State to become a clearinghouse for green building information. These tools differ from education programs in that they provide others with methods to accomplish goals, rather than simply information. The State could use its staff expertise to develop models for other jurisdictions to adopt or follow, create resource guides, or make staff available to provide technical assistance to those who wish to pursue green building practices.

TOOL #17: CREATE A STATEWIDE GREEN BUILDING PROGRAM

Currently, several residential green building programs exist in Washington State, primarily in the Puget Sound area: Built Green™ of King and Snohomish Counties, Built Green/Build a Better Kitsap County, and Build a Better Clark County. Also, any commercial project can obtain LEED™ certification. However, no statewide, consistent standard for residential green buildings exists.

The State could create a statewide green building program, based upon the Built Green™ program, which would provide resources for builders and consumers in eastern Washington and complement existing programs in the Puget Sound region. The City of Austin, Texas, has a nationally recognized green building program that provides a wide range of services for residential, commercial, multi-family, and municipal construction, and also provides consulting services to utilities and government agencies.⁶⁶ This extremely successful program, along with the programs in King, Snohomish, Kitsap, and Clark Counties, could and should serve as models for a similar program in Washington State.

Washington State should consider adding standards for remodeling and deconstruction services to its statewide program, because these two activities generate substantial amounts of waste annually. Currently, the Built Green™ program is a self-certification program in which builders submit completed checklists to the Built Green™ program staff. Washington State could adopt this model, or consider providing training to staff or to the private sector to become independent certifiers of buildings under the state program.

Political feasibility: In the current budget climate, the political feasibility of this program is medium because developing and staffing such a program likely would take several FTE; the Austin program has 14 staff members listed on its website. However, a statewide green building program likely would be very popular, so long as the jurisdictions that already have programs understand that it is complementary rather than redundant. Over the long-term, as the state budget recovers, the political feasibility of this program should increase to high.

Practical feasibility: The practical feasibility of such a program is high. Austin's program is an outstanding example that Washington could emulate – in fact, Washington could even engage Austin's consulting services if desired.

⁶⁶ <http://www.ci.austin.tx.us/greenbuilder/>

Cost-effectiveness: The cost-effectiveness of this program is likely to be high, especially if it is as well designed as Austin's. Although the State would need to invest in FTE for the program, the wealth of services and information that the State could provide likely would go far in increasing green building in Washington, particularly eastern Washington. In addition, this program would be an excellent public relations tool for the State.

Projected outcome: The expected outcome of this tool is that the demand for and supply of green building would increase in Washington State.

Key challenges: The key challenge for this tool is obtaining sufficient funding and staff support to provide an excellent program.

Success factors: Key success factors include gathering success stories from Austin and local programs, as well as developing information to show how green building achieves many of the State's goals, to support a coordinated lobbying effort. In addition, the State should consider forming partnerships with local governments and industry associations such as the Master Builders Association, American Institute of Architects, or the National Association of Home Builders to help generate support for the program.

Performance measures: Performance measures for this tool include the following:

- Track visitors to the program's website.
- Track requests for and provision of technical assistance.
- Survey clients of the program to determine satisfaction levels and the role of the program in influencing their building decisions.
- Follow builders who use the program's services to determine whether they employ techniques learned through the program in subsequent projects.

TOOL #18: MODEL CODES AND SPECIFICATIONS

As mentioned above in the Lead by Example section, many experts interviewed for this study cited the frustration that results when building codes do not accommodate green building practices, technologies, or materials. Also, specifications often don't exist for green building products, or don't allow them. The State staff could create a set of model codes and specifications that local jurisdictions, developers, and architects could use or adapt for their purposes. Ideally, these codes and specifications would be on a website for easy access. The State should consider determining which codes and specifications are lacking, and partnering with the Washington State Building Code Council to develop these models.

Political feasibility: The political feasibility of this tool is high. Citizens and industry often look to government to provide educational materials and examples. Since these codes and specifications would be provided as models, local jurisdictions could choose to use them if they wish, and those with small staffs may find them to be extremely timely and useful. Also, the suppliers of materials or services for which specifications are developed are certain to support such efforts.

Practical feasibility: The practical feasibility of this tool also is high. The State could form partnerships with the State Building Code Council, materials suppliers, service

providers, and others as necessary to obtain the information necessary to create model codes and specifications. Some local governments, such as King County, have developed model specifications for services such as jobsite recycling already⁶⁷; the State also could learn from and build upon these.

Cost-effectiveness: The cost-effectiveness of this tool is high. The costs to the State would consist of the staff time necessary to research, develop, and update the model codes and specifications, and to build and maintain a website. The benefits from this tool include recognition of the State as a leader and resource in green building, the potential to decrease building industry frustration, and the potential to increase adoption of green building materials, services, technologies, and practices.

Projected outcome: The projected outcome of this tool is an increase in the supply of green buildings, due to increased ability to use green products, practices, and services.

Key challenges: Key challenges associated with it include finding the right partners, especially among building code officials, to work with to develop the models.

Success factors: Key success factors include effective advertising of the website and testing of the models to ensure that they truly work.

Performance measures: Performance measures for this tool include the following:

- Track visits to the website.
- Include a response form on the website so that users of the models can send comments to the State.
- Track the number of communities that adopt the model codes and specifications.

TOOL #19: CREATE A RESOURCE GUIDE/SERVE AS A CLEARINGHOUSE

The number of websites that discuss green building, green products, green services, and green technologies is exploding. Some experts interviewed for this study were frustrated because it is difficult to find the information that they need, precisely because the websites are so numerous and so diffuse. The State could create one website with a searchable database of green building information, including the latest information about the performance of green materials, services, and technologies, model codes and specifications, state incentive programs (if any), and case studies of green projects. The City of Austin's green building website could serve as a model, although it does not contain information about products.

Of course, the State would have to work hard so that its website doesn't become part of the problem rather than a solution to it. In order to be effective, the State would have to convince suppliers of green building products and services that their website is the place to post information about their products, so that the site stays current and comprehensive. Also, the State would need to update the site frequently and conduct its own research to be sure it truly does contain the latest information. Lastly, the site would need to be marketed – or at least well linked – so that everyone from consumers to contractors to building departments to manufacturers uses it.

⁶⁷ http://dnr.metrokc.gov/swd/bizprog/sus_build/how_others.htm#specs

One alternative method of using this tool would be for the State to provide the funding for a non-profit organization to create and maintain this website. This method would reduce the amount of staff time needed to use the tool. However, the analysis below evaluates the tool assuming that the State creates and maintains the website.

Political feasibility: The political feasibility of this tool is high. Few people would object to the State's developing and maintaining a website that provides useful information to the public.

Practical feasibility: The practical feasibility of this tool is medium. Although the State has the expertise to create and maintain a website, the work involved to keep it current and useful would be significant.

Cost-effectiveness: The cost-effectiveness of this tool depends on how useful it is. As mentioned above, the cost to the State in terms of staff time would be significant. In order for the benefits of this tool to outweigh the costs, the site would have to become very well known among the building industry, local governments, and consumers.

Projected outcome: If the site is well maintained, the projected outcome is that the State would become known as a clearinghouse for green building information, and the public would find it much easier to locate the information it needs to adopt green building practices.

Key challenges: Key challenges for this tool, of course, include keeping it current and comprehensive, and ensuring that it's easy to use.

Success factors: Key success factors include dedicating one or more FTE to developing and maintaining this site, marketing it effectively to potential users, and ensuring that the content of the website reflects the active involvement of all State programs.

Performance measures: Performance measures for this tool include the following:

- Track visits to the website.
- Include a comment form on the site so that users can send in suggestions. Compare the numbers of compliments, constructive suggestions, and complaints.
- Track the number of sites that post links to the State's site.
- Record the number of times that manufacturers and service providers contact the State asking that their product be listed on the site. Determine if it increases over time.

TOOL #20: PROVIDE TECHNICAL ASSISTANCE

Several of the individuals from eastern Washington interviewed for this study asserted that they would never have been able to complete a green building project without assistance from Ecology. The State could build upon these successes to create a mentorship program in which State staff provide technical assistance to builders who wish to learn how to build green. The State could expand this program to include educational courses during the winter, when construction tends to slow.

Political feasibility: The political feasibility of this program currently is medium. Although the building industry likely would support it, particularly in eastern Washington, the costs of adding staff for the program may be prohibitive in this budget climate.

Practical feasibility: The practical feasibility of this program is high. Ecology staff such as Jim are already providing these services and doing very well at it.

Cost-effectiveness: The cost-effectiveness of this program likely would be high. Although adding staff is expensive, the program would generate tremendous goodwill for the agency and result in increased numbers of green buildings in Washington, particularly eastern Washington.

Projected outcomes: The likely outcomes of this tool are increased goodwill for the State, and an increase in the supply of green buildings.

Key challenges: Key challenges include obtaining the staff necessary for the program, and marketing the program effectively to the building industry. Staff must be people with credibility to the industry.

Success factors: Key success factors include rallying industry support for the program and publishing case studies showcasing the successes of the program.

Performance measures: Performance measures for this tool include the following:

- Track the numbers of builders who use the program.
- Survey builders at the completion of the projects on which they receive assistance. Ask for suggestions to improve the program and comments about its strengths and weaknesses.
- Follow builders after their initial green projects are complete to determine whether they employ green methods on subsequent projects.

TOOL #21: TEST GREEN BUILDING MATERIALS

This tool takes aim at the resistance to change and codes and specifications barriers. One of the major obstacles to the widespread acceptance of green building materials is that contractors and building code officials do not have proof that they are effective, safe, and durable. The Beyond Waste partners could test new green building products as they become available to provide this proof, and help to overcome resistance to incorporating these new, environmentally benign materials.

Political feasibility: The political feasibility of this tool is high. Although finding funding for conducting such tests may be a challenge for the Beyond Waste partners, manufacturers should support such tests and perhaps even help defray their costs.

Practical feasibility: The practical feasibility of this tool varies with the building material that requires testing. Although accepted tests may be available for some materials, new tests may need to be developed for others.

Cost-effectiveness: The cost-effectiveness of this tool is high, especially if manufacturers help to defray the costs of the tests. A relatively modest investment in developing and conducting tests could lead to widespread acceptance of environmentally benign building materials.

Projected outcomes: Successful testing of environmentally benign building materials will help to eliminate toxics, reduce waste, and increase use of recycled-content and easily recyclable materials.

Key challenges: The primary challenges to implementing this tool are finding funding to conduct the tests, and developing new tests where necessary.

Success factors: Partnering with manufacturers will help to defray costs, but it will be important to ensure that the tests remain objective.

Performance measures: Performance measures for this tool include the following:

- Compare the use of tested to untested green building materials.
- Compare the use of green building materials before and after testing.
- Survey architects and contractors who use tested green building materials to determine the role of the test results in their decision to use the materials.
- Track requests for test results.

LEGISLATIVE AND INFRASTRUCTURE TOOLS

This set of tools focuses primarily on the State's ability to work with local governments and the private sector to improve the economics of green building through changing policies and increasing the infrastructure available for recycling and processing building materials. If tip fees are higher, recycling services are more convenient, and high value markets are available, builders are much more likely to recycle. Recycling of construction and demolition debris is a small but important part of both the LEED™ and Built Green™ standards. Because local governments, rather than the state, provide this infrastructure, the success of these tools depends upon the State's ability to leverage strong working relationships with their local counterparts.

In addition, this section describes one tool to encourage the local manufacturing of green building products, thus increasing the ability of builders to incorporate these materials.

TOOL #22: CREATE INCENTIVES⁶⁸ TO DEVELOP MORE PROCESSING CAPACITY IN RURAL AND UNDERSERVED AREAS

Several experts interviewed for this study stated that the best way to increase recycling of construction and demolition debris in rural and underserved areas is to provide processing services, particularly for concrete and gypsum. Currently there are no processors of these materials in rural areas, so they must be shipped to Seattle, Portland, or other distant locations. Concrete and gypsum are very heavy, high volume wastes, so transportation costs are prohibitive, and the materials end up in landfills.

The State could form partnerships with the private sector to develop one or more processing facilities for gypsum, concrete, and potentially other materials in rural areas. The State could lobby the Legislature for action to allow a tax credit or other incentive that would encourage processors to locate in rural and underserved areas. Alternatively, the State could work with local governments in these locations to encourage them to provide reductions in local taxes or other incentives.

Political feasibility: The political feasibility of this tool is medium. Tax credits and incentives are very attractive, but in the state's current budget climate, it may be difficult to convince the Legislature or local governments to provide them. However, this tool would create jobs in rural areas, a desirable outcome, and with time the state's budget should improve with the economy.

Practical feasibility: Practically speaking, the feasibility of this tool is high. The technology exists to recycle gypsum and concrete, as well as other materials such as clean wood. It may be even more feasible if other tools, such as a ban on disposal of these materials, were used to help assure processors of a steady supply of material.

Cost-effectiveness: The cost-effectiveness of this tool would be high. For a reasonable investment of staff time and money, the State would gain a viable recycling infrastructure for two materials that currently are disposed in great volumes in rural areas.

Projected outcome: The projected outcome of this tool is the creation of a processing facility for gypsum and concrete, and increased recycling of these materials.

⁶⁸ Although this tool is an incentive, it is in this category because it addresses an infrastructure need.

Key challenges: The key challenges for this program are simply obtaining authorization to get it started, and locating an entrepreneur who is willing to work with the State to do so.

Success factors: Key success factors include gathering information to support the need and market for this type of facility so that both the Legislature and the private sector will be interested.

Performance measures: Performance measures for this tool include tracking the generation, disposal, and recycling rates of concrete and gypsum before and after the facility is operational.

TOOL #23: DEVELOP MORE FACILITIES FOR RECYCLING CONSTRUCTION AND DEMOLITION DEBRIS IN URBAN AREAS

In the interviews conducted for this study, several experts expressed frustration at having to drive long distances and battle the famous Seattle-area traffic to bring construction and demolition debris to transfer stations for recycling. These experts stated that building additional transfer stations, particularly east of Lake Washington, or adding recycling services at existing transfer stations, would help increase contractor willingness to recycle construction and demolition debris.

The State could work with owners of transfer stations – usually either local governments or private businesses – to add recycling facilities. If desired, the State also could work with local governments to build additional transfer stations.

Political feasibility: The political feasibility of adding recycling facilities to existing transfer stations is medium. Although neighborhoods may object to the expansion, this opposition should be muted in comparison to the opposition to new transfer stations. The political feasibility of building new transfer stations is low due to the extreme difficulty of finding sites for such facilities.

Practical feasibility: The practical feasibility of adding recycling facilities to existing transfer stations depends largely upon whether the individual site has room for the new facilities, usually drop boxes. However, the practical feasibility of siting new stations is low – without sites, no transfer stations can be built.

Cost-effectiveness: The cost-effectiveness of this tool would be medium, because it would add only incremental amounts of service to a system that already functions fairly well. However, such improvements have the potential to increase diversion of waste, thus helping to achieve the Beyond Waste Vision.

Projected outcomes: The projected outcomes are that more contractors would recycle and that it would be less costly for them to do so.

Key challenges: Key challenges include finding funding for additional recycling services and obtaining the proper permits. If new transfer stations are desired, the primary challenge is finding sites to put them on.

Success factors: Key success factors include forging partnerships with the transfer station operators to add recycling services, and if new stations are built, working with local communities to address their concerns.

Performance measures: Performance measures for this tool include the following:

- Track recycling rates of construction and demolition debris before and after building new stations or adding new services.
- Track use of the new stations or services.
- Survey users of the new stations or services to determine whether they previously used other stations, or if recycling is new for them. Ask whether the new services were a factor in their decision to recycle.

TOOL #24: PROVIDE INCENTIVES⁶⁹ TO ENCOURAGE LOCAL MANUFACTURING OF GREEN PRODUCTS

One of the credits available in the LEED™ standards requires builders to use materials manufactured within a radius of 500 miles. However, some of the experts interviewed for this study noted that some very useful green building materials are not manufactured in Washington or even in the Pacific Northwest, making it difficult to obtain this credit. The State could work to provide manufacturers with incentives that made locating in Washington attractive, such as a tax credit or construction of freeway exits. However, tax credits require legislative action in Washington State, so the State would need to develop an effective campaign to achieve them, perhaps based upon the following benefits: this tool would help builders achieve the LEED™ credit, create jobs and stimulate the economy, and -- depending on the product -- improve markets for recycled materials.

Another primary benefit of this tool is that it should influence manufacturers to design and produce environmentally responsible building materials. If manufacturers of traditional building materials observe that incentives are available to their competitors who produce benign materials, traditional manufacturers may seek to find ways to reduce the adverse effects of their products.

Political feasibility: The political feasibility of this tool is medium. The prospects of job creation, economic stimulation, and achievement of several environmental goals at one stroke all increase the political feasibility of this tool. However, the state budget crunch may make it more difficult to convince the Legislature to take special action to provide a tax credit.

Practical feasibility: The practical feasibility of this tool varies, depending upon the type of manufacturer, the availability of feedstock, and the ability to find a site. However, manufacturing processes for many green building materials do exist, and it should be possible to find companies willing to locate in Washington.

Cost-effectiveness: The cost-effectiveness of this tool likely is high, particularly if the chosen green products incorporate recycled feedstocks. For the cost of whatever

Case Study:
Rastra

One of the experts interviewed for this study, Thomas Bristol, recently built a house out of Rastra, a product made from recycled concrete and post-consumer Styrofoam. The major hurdle with using this material was that it cost \$2400 to ship it from the Texas/Mexico border, where it is made. Mr. Bristol plans to fly to Texas to see if he can interest the manufacturer in producing Rastra in Washington State.

⁶⁹ Although this tool is technically an incentive, it is grouped in this category because it helps develop infrastructure.

support it can provide, the state will gain jobs, economic stimulus, access to green products, and potentially a market for recycled materials.

Projected outcome: The projected outcome of this tool is that the availability of green products will increase locally, improving the ability of builders to achieve LEED™ standards and increasing the supply of green buildings. It also increases markets for recycled materials, and should foster design for the environment.

Key challenges: The key challenges for this program are obtaining authorization from the Legislature to provide a tax credit or other incentive, and determining which building materials are truly green and therefore eligible for incentives.

Success factors: The key success factor is to emphasize the economic and social benefits that would flow from this tool, as well as the environmental ones, in a lobbying campaign.

Performance measures: Performance measures for this tool include the following:

- Track the number of builders who obtain this LEED™ credit when certifying buildings under LEED™ before and after the facilities are built.
- Track the number of jobs created and estimate the effect of these wages on the local economy.
- If the facility uses recycled feedstocks, estimate the amounts incorporated annually.
- Track the increase of locally manufactured products and sales volumes.

TOOL #25: ADVOCATE FOR A REGIONAL OR NATIONAL PRODUCT STEWARDSHIP PROGRAM FOR CONSTRUCTION AND DEMOLITION WASTE

The Northwest Product Stewardship Council defines product stewardship as follows:

Product Stewardship is an environmental management strategy that means whoever designs, produces, sells, or uses a product takes responsibility for minimizing the product's environmental impact throughout all stages of the products' life cycle. The greatest responsibility lies with whoever has the most ability to affect the lifecycle environmental impacts of the product.⁷⁰

This tool calls for the State to work with other states to develop a regional or national program that requires manufacturers of building materials to assume responsibility for the entire life cycle of their products. If manufacturers were responsible for the end-of-life disposition of their products, they would be much more likely to design products that are environmentally benign and can be recycled easily, perhaps even into new versions of the same products. Product stewardship has other benefits as well – it requires manufacturers to internalize the true costs of their products, and removes the burden of managing obsolete products from governments.

⁷⁰ <http://www.productstewardship.net/>

Voluntary product stewardship programs for carpet and paint are under development in the US, and Washington State is participating in these initiatives. If successful, these programs should be expanded to a regional or national scope. However, if such voluntary approaches fall short of full participation or effectiveness, it may be necessary to switch to a regulatory approach. Also, the partners might wish to choose a small number of building materials to focus on at the outset, particularly those that contain toxics, and then expand the program once it gains acceptance and momentum.

Political feasibility: The political feasibility of product stewardship programs for the building industry in the United States is uncertain due to industry opposition. Voluntary programs are more politically feasible than regulatory ones, but require that all stakeholders reach agreement. In general, American industries have resisted many such initiatives in the past but are negotiating on others, such as for electronics. However, negotiations are not moving quickly and some states are trying legislative approaches instead.

Practical feasibility: The practical feasibility of a national product stewardship program for selected building materials is medium. Existing programs could serve as effective models for new or expanded programs. However, the mechanics of an effective and efficient product stewardship program for building materials would need to be carefully thought through.

Cost-effectiveness: Although the cost of enacting such a program would be high in terms of human resources devoted to negotiating with industrial partners, it also would be very effective at improving the design and disposition of building products. Such a program may also help develop higher value markets for recyclable building materials, another Beyond Waste goal, as well as reduce or eliminate the burden of handling construction and demolition debris on local governments.

Projected outcomes: The likely outcomes from this tool would be reduction of toxic substances in building materials, development of building materials that can be more easily disassembled, increases in recycling rates for the selected materials, and higher value uses of the recycled materials.

Key challenges: The key challenges to enacting this program are designing it so that it is effective and efficient, and engaging industry participation in it.

Success factors: Development of a regional or national program, rather than a Washington State program, and working with manufacturers to design a program that works well for them and the environment are key to this tool's success. Also, the partners should consider selecting products with hazardous contents for the initial phase of a product stewardship program, since these products have obvious adverse environmental effects and may be more compelling.

Performance measures: Performance measures for this tool include the following:

- Compare the designs of the chosen materials before and after the program. Check for the use of toxic and recycled materials, and design for disassembly.
- Compare the disposal and recycling rates of the chosen materials before and after implementation of the product stewardship program.
- Survey manufacturers of other building materials to determine whether they proactively are beginning to design their products for the environment.

- Determine whether manufacturers are internalizing the life-cycle costs of their products.

TOOL #26: BAN DISPOSAL OF RECYCLABLE CONSTRUCTION AND DEMOLITION DEBRIS AFTER 2008

Many contractors continue to dispose of construction and demolition debris in landfills because it's more convenient still than recycling, or because it may cost more to recycle, especially in eastern Washington. Banning disposal would create a level playing field in which all builders pay any additional costs to recycle, instead of just those who have an environmental ethic. This change, coupled with most builders' desire to comply with the law, would reduce the disposal of construction and demolition materials to practically zero. Banning disposal also would increase recycling rates substantially, perhaps making it economically viable for the private sector to build additional processing and remanufacturing facilities, given a guaranteed feedstock and healthy markets.

The State could choose to ban disposal after a certain date, such as 2008, to give contractors, recyclers, processors, manufacturers, and local governments time to prepare. The State also could choose to ban only certain materials for which services and markets exist, such as concrete, gypsum, asphalt, and clean wood. However, before instituting such a ban, the state would need to ensure that alternatives to disposal are in place.

Political feasibility: The political feasibility of this approach is medium. Many local governments, particularly those in the Puget Sound area, likely would support a ban. However, many in the building industry and possibly local governments in eastern Washington would oppose it, especially if flow control is an issue. If the state must provide alternatives to disposal, then the feasibility is reduced to low because developing these services would be expensive.

Practical feasibility: Practically speaking, a ban is moderately feasible. Although other substances are banned from landfills already, enforcing bans tends to be difficult.

Cost-effectiveness: The cost-effectiveness of a ban would be high if alternatives to disposal are in place. Most builders are law-abiding people who would obey the ban, thus diverting hundreds of thousands of tons of waste annually.

Projected outcomes: The likely outcomes of this tool are a substantial decrease in the disposal of construction and demolition debris.

Key challenge: The key challenges for this tool are winning political support for it, and preventing illegal dumping once the ban is in place.

Success factors: The key success factor is to have alternatives to disposal in place before starting to work on instituting a ban. With such alternatives in place, opposition forces will have less solid ground to stand on.

Performance measures: Performance measures for this task include the following:

- Track generation, disposal and recycling rates of construction and demolition debris before and after the ban.

- Conduct an anonymous survey of builders to determine compliance rates with the ban.

SUMMARY

The table below summarizes the consultant team's assessment of all tools presented in this chapter.

Table 6: Assessment of all tools

Tool	Political Feasibility	Technical Feasibility	Cost-Effectiveness	Outcomes	Challenges	Success Factors
1. Adopt LEED™ standards for new State buildings	High	High	High	<ul style="list-style-type: none"> ▪ All new State buildings LEED™ certified ▪ Lower life-cycle costs for buildings ▪ Increased WR/R ▪ Better markets for green materials ▪ Building industry education 	<ul style="list-style-type: none"> ▪ Opposition in Legislature ▪ Staff time needed to implement ▪ Additional upfront costs to build State facilities 	<ul style="list-style-type: none"> ▪ Coordinated lobbying effort ▪ Partnerships with industry associations
2. Amend State purchasing requirements	Medium	Varies	High	<ul style="list-style-type: none"> ▪ Better markets for green materials 	<ul style="list-style-type: none"> ▪ Building industry opposition 	<ul style="list-style-type: none"> ▪ Develop clear criteria ▪ Provide technical assistance
3. Require all renovations of State-leased space to be LEED™ certified	Medium	High	High	<ul style="list-style-type: none"> ▪ All State space LEED™-certified ▪ State would be national leader in green building ▪ Remodelers educated 	<ul style="list-style-type: none"> ▪ Political opposition ▪ Tight State budget 	<ul style="list-style-type: none"> ▪ Phased approach ▪ Partner with Master Remodelers Association
4. Modify State building code to accommodate green building	High	Medium	Medium	<ul style="list-style-type: none"> ▪ Green building easier statewide ▪ Increased building industry satisfaction ▪ Possibly increased innovation 	<ul style="list-style-type: none"> ▪ Dislike of change ▪ Lack of information to support changes 	<ul style="list-style-type: none"> ▪ Create partnerships to gather information and build support
5. Ensure other State regulations accommodate	Medium	Medium	Varies	<ul style="list-style-type: none"> ▪ Green building somewhat easier statewide 	<ul style="list-style-type: none"> ▪ Time to find places that need fixing ▪ Lack of information to 	<ul style="list-style-type: none"> ▪ Create partnerships to gather information and build support

Tool	Political Feasibility	Technical Feasibility	Cost-Effectiveness	Outcomes	Challenges	Success Factors
green building					support changes	
6. Manage natural capital sustainably	Medium	Varies	Uncertain	<ul style="list-style-type: none"> ▪ Increased supply of certified wood products ▪ Increased supply of other green building materials 	<ul style="list-style-type: none"> ▪ Industry opposition ▪ Updating practices 	<ul style="list-style-type: none"> ▪ Partnership with WDNR ▪ Partner with environmental and green building groups
7. Consumer education program	High	High	Varies	<ul style="list-style-type: none"> ▪ Increased demand for green building 	<ul style="list-style-type: none"> ▪ Identifying audience, message, and delivery ▪ Tight state budget 	<ul style="list-style-type: none"> ▪ Partnerships ▪ Demonstrate success
8. Architect education	High	High	High	<ul style="list-style-type: none"> ▪ Green building becomes standard practice 	<ul style="list-style-type: none"> ▪ Work with partners to develop value-added programs 	<ul style="list-style-type: none"> ▪ Forge partnerships with architectural associations
9. Contractor education	High	High	High	<ul style="list-style-type: none"> ▪ Increased contractor acceptance of green materials and practices ▪ Increased jobsite WR/R 	<ul style="list-style-type: none"> ▪ Convincing contractors to participate 	<ul style="list-style-type: none"> ▪ Forge partnerships with contractor associations
10. Production home developer education	High	High	High	<ul style="list-style-type: none"> ▪ Dramatic increase in supply of green homes 	<ul style="list-style-type: none"> ▪ Making the business case to developers 	<ul style="list-style-type: none"> ▪ Partnerships with industry groups and production developers that already build green
11. Develop information on costs and benefits	High	High	High	<ul style="list-style-type: none"> ▪ Increased demand for green building 	<ul style="list-style-type: none"> ▪ Find buildings to study ▪ Choose study methods 	<ul style="list-style-type: none"> ▪ Forge partnerships with building owners ▪ Distribute information widely
12. Tax credits	Varies	High	Varies	<ul style="list-style-type: none"> ▪ Builders would pitch green buildings to customers ▪ Increase supply of green 	<ul style="list-style-type: none"> ▪ State budget crunch ▪ Opposition from those whose programs may be cut 	<ul style="list-style-type: none"> ▪ Rally industry support ▪ Ensure credit is large enough to be

Tool	Political Feasibility	Technical Feasibility	Cost-Effectiveness	Outcomes	Challenges	Success Factors
				buildings	<ul style="list-style-type: none"> How to keep momentum after law sunsets 	<ul style="list-style-type: none"> worthwhile Create a simple, effective program
13. Mini-grants	High	High	Medium	<ul style="list-style-type: none"> Increase demand for green buildings 	<ul style="list-style-type: none"> Publicize the program effectively Keep the application simple 	<ul style="list-style-type: none"> Partner with utilities Publicize the program effectively Keep the application simple
14. Rebates and discounts	Medium	Medium	High	<ul style="list-style-type: none"> Increase demand for green products & services Spur innovation 	<ul style="list-style-type: none"> State budget crunch Identify appropriate products 	<ul style="list-style-type: none"> Effective lobbying Good information about chosen products
15. Permits and regulations	Varies	Medium	Medium	<ul style="list-style-type: none"> Increase supply of green buildings 	<ul style="list-style-type: none"> Work with lots of local jurisdictions Some industry opposition 	<ul style="list-style-type: none"> Good relationships with local jurisdictions Develop effective ways to streamline
16. Grant programs	High	Medium	High	<ul style="list-style-type: none"> Increase innovation in building materials Increase manufacturing capacity Increase Green services Create jobs 	<ul style="list-style-type: none"> Market to Legislature 	<ul style="list-style-type: none"> Stress job creation and economic stimulation aspects Keep the program simple
17. Create a statewide green building program	Medium	High	High	<ul style="list-style-type: none"> Increased demand for and supply of green buildings Define a role for the State 	<ul style="list-style-type: none"> Obtaining sufficient funding and staff 	<ul style="list-style-type: none"> Success stories from other places Information on benefits Partnerships with industry
18. Create model	High	High	High	<ul style="list-style-type: none"> Increase supply of green 	<ul style="list-style-type: none"> Find the right partners 	<ul style="list-style-type: none"> Test the models to

Tool	Political Feasibility	Technical Feasibility	Cost-Effectiveness	Outcomes	Challenges	Success Factors
codes and specifications				buildings		ensure they work ▪ Advertise the site
19. Create a resource guide/serve as a clearinghouse	High	Medium	Varies	<ul style="list-style-type: none"> ▪ Define a role for the State ▪ Improve access to information 	<ul style="list-style-type: none"> ▪ Keeping the site current and comprehensive 	<ul style="list-style-type: none"> ▪ Dedicated staff
20. Provide technical assistance	Medium	High	High	<ul style="list-style-type: none"> ▪ Increased goodwill for the State ▪ Increased supply of green buildings 	<ul style="list-style-type: none"> ▪ Funding for staff ▪ Marketing the program to industry 	<ul style="list-style-type: none"> ▪ Credible staff ▪ Industry support ▪ Publish case studies
21. Test green building materials	High	Varies	High	<ul style="list-style-type: none"> ▪ Reduce toxic materials and waste ▪ Increase use of recycled-content and recyclable materials 	<ul style="list-style-type: none"> ▪ Finding funding for tests ▪ Developing tests where necessary 	<ul style="list-style-type: none"> ▪ Partnerships ▪ Keep tests objective
22. Increase processing capacity in rural areas	Medium	High	High	<ul style="list-style-type: none"> ▪ Increased processing capacity ▪ Increased recycling of concrete & gypsum 	<ul style="list-style-type: none"> ▪ Finding funding ▪ Finding appropriate partners 	<ul style="list-style-type: none"> ▪ Gather information to support need for facility and market for materials
23. Develop more recycling services in urban areas	Varies	Varies	Medium	<ul style="list-style-type: none"> ▪ Increased recycling ▪ Decreased costs of recycling 	<ul style="list-style-type: none"> ▪ Finding funding ▪ Finding sites 	<ul style="list-style-type: none"> ▪ Forging effective partnerships
24. Increase local manufacturing of green products	Medium	Varies	High	<ul style="list-style-type: none"> ▪ Increased local availability of green materials ▪ Increased design for environment ▪ Increased supply of green buildings 	<ul style="list-style-type: none"> ▪ Authorization from Legislature ▪ Determining which building materials are green 	<ul style="list-style-type: none"> ▪ Emphasizing economic and social benefits

Tool	Political Feasibility	Technical Feasibility	Cost-Effectiveness	Outcomes	Challenges	Success Factors
25. Advocate for a regional or national product stewardship program	Uncertain	Medium	High	<ul style="list-style-type: none"> ▪ Reduced use of toxic materials ▪ Increased design for disassembly ▪ Increased recycling ▪ Higher value uses for recycled materials 	<ul style="list-style-type: none"> ▪ Design an effective program ▪ Engage industry opposition 	<ul style="list-style-type: none"> ▪ Foster a regional or national program ▪ Select a few toxic materials to start ▪ Work with industry to design program
26. Ban disposal of construction and demolition debris	Medium	Medium	High	<ul style="list-style-type: none"> ▪ Decreased disposal ▪ Increased recycling 	<ul style="list-style-type: none"> ▪ Generating political support ▪ Preventing illegal dumping 	<ul style="list-style-type: none"> ▪ Having alternatives to disposal in place ahead of time

5. Action Plan

This paper has addressed three questions:

- What is needed to make green building practices mainstream in Washington?
- What is necessary to achieve maximum reuse and recycling of construction and demolition materials?
- What is required to transform the design of buildings and materials to fully achieve the Beyond Waste Vision?

These three questions illustrate that achieving the Beyond Waste Vision for green building involves three essential transformations:

1. **Green building practices must become the standard, not the exception.** These practices must be as commonplace as safety measures, and taught to architects, contractors, engineers, and others as the logical, normal way to build a building.
2. **Construction and demolition debris must be reduced, reused, and recycled to the extent possible.** Achieving this transformation will require the infrastructure and markets to support recycling and reuse of debris to be in place and thriving. In particular, a deconstruction industry must arise and thrive in Washington State, and processing and handling capacity must be great enough to handle the amount of debris generated.
3. **Buildings and materials must be designed to reduce or eliminate negative environmental, social, and economic effects.** This major transformation is an umbrella for a host of critical changes. Buildings must become living buildings, generating no waste and actually contributing to rather than taking from the environment and society. Toxic components must be phased out of building materials or recaptured for recycling, and materials must be designed to stay in the organic or technical nutrient⁷¹ cycles. Staying in one cycle or the other allows these materials to be reused and recycled easily and efficiently.

The Washington State Department of Ecology is but one of the entities that can take strategic action to help bring about the Beyond Waste Vision for green building. However, because Ecology is the author of the Beyond Waste Plan, this Action Plan focuses upon actions that Ecology can take. In other words, this Action Plan targets a subset of the necessary changes that are appropriate for Ecology to undertake. While Ecology follows this Action Plan, a variety of other actors, including parts of the building industry, recycling industry, and building materials industry, will be busy promoting green building practices and moving Washington toward the Beyond Waste Vision.

It is important to note here that while the strategies below were developed for Ecology, the Department could pursue them in a variety of ways. Ecology could take the lead role in some actions, but in others it might act as a coordinator, a cheerleader, or a partner. Partnerships with other state agencies, the private sector, and non-profit organizations will be crucial to achieving the Beyond Waste Vision for green building in Washington

⁷¹ Technical nutrients are materials such as glass, metal, or plastic that remain in a closed-loop cycle of manufacturing, reuse, and recovery, and retain their value through many product cycles.

State. Where possible, the consultant team has provided suggestions for Ecology's role. However, Ecology is the best and final judge of its strengths, partnerships, and authority.

The consultant team used the Governor's Sustainable Washington Advisory Panel's draft recommendations to frame this Action Plan. The Sustainable Washington Advisory Panel's draft report recommends that Washington achieve full sustainability within thirty years. Therefore, the strategies and goals in the Action Plan are designed to move the state aggressively toward that target.

The Action Plan presents strategies under three timeframes:

- **Immediate Actions** (0-3 years). This group includes actions that capitalize on trends and leverage points that are available now, as well as actions that lay the foundation for achieving change in the future.
- **Near-Term Actions** (3-10 years). These actions focus upon strengthening the capacity of the building industry to provide green buildings, continuing the good work begun in the Immediate Actions, and tackling more complex issues.
- **Long-Term Actions** (10-30 years). Many of the actions taken earlier should start to bear fruit in this time period. However, aggressive action will be necessary still to make green building practices the norm. Actions in this timeframe focus on evaluating progress and taking stock of the building industry to ensure that programs build upon positive trends and counteract negative ones. Green building practices, materials, and design must start becoming mainstream during this time period.

Within each timeframe, the actions are organized around the three goals embedded in the three questions that guided this paper. Each section also contains strategies to evaluate progress toward the Beyond Waste Vision in Washington State.

IMMEDIATE ACTIONS (0-3 YEARS)

The actions below are ones that the State should pursue as quickly as possible. These strategies capitalize upon the State's purchasing power to build immediate demand for green buildings and building materials, and therefore begin to build capacity in the building industry as well. Several actions also are important steps that lay the foundation for vital outcomes in the future.

MAKE GREEN BUILDING PRACTICES MAINSTREAM

As Chapter 2 describes, green homes represent about 2% of new housing starts annually, and green buildings constitute much less than 1% of new commercial buildings annually in Washington State. The goals of the actions below are to increase that market share in both categories to 10% and to establish Washington State as a national leader in green building.

1. **Adopt LEED™ standards for all new State buildings.** The State is a critical customer of the building industry – it requires buildings to house its staff, and constructs everything from park visitor centers to fish hatcheries. This action would guarantee a market for green building practices and materials, and provide a very strong incentive for economic actors that value the State's business to

master green building practices and techniques. Because the State constructs so many buildings, its purchasing decisions represent a very effective leverage point. This action would address the lack of awareness, resistance to change, learning curve and design of buildings barriers. In addition, this action is “ripe” – the Governor’s Sustainability Panel and the Joint Legislative Task Force on Green Building both have recommended that the State adopt LEED™ standards.

2. **Make a residential Built Green™ program available to all state residents and homebuilders.** This green building program is the residential counterpart to the LEED™ standards, which currently exist only for commercial and institutional buildings. A statewide program would make green building standards available for all homes in Washington State, and would be complementary to those Built Green™ programs that already exist in the Puget Sound area. To maximize effectiveness, the statewide program should include standards for eliminating toxic building materials, and for home renovations as well as new construction. This action would operate upon the leverage point of consumer demand, and address the lack of awareness, resistance to change, learning curve and design of buildings barriers.
3. **Market green building programs in both the residential and commercial/institutional sectors.** The purpose of this action is to increase awareness of the availability of the LEED™ and Built Green™ programs, and thereby increase demand for green buildings built with green building materials. In other words, the goal of this action is to develop markets for green buildings. This action targets the leverage point of consumer demand, and helps to overcome the lack of awareness, resistance to change, and design of buildings barriers.
4. **Help builders build green.** Establishing and marketing green building programs is an important step towards spreading green building practices throughout Washington State. However, these programs will fall short if builders do not know how to use them, where to get green building materials, or how to design green buildings. This action calls upon the State to expand its technical assistance program to include information that will help builders build to both LEED™ and Built Green™ standards, and beyond. This action will help to overcome the learning curve, lack of awareness, and resistance to change barriers.
5. **Ensure State procurement guidelines require the purchase of environmentally preferable building materials.** Like Action 1, this action capitalizes upon the State’s tremendous purchasing power. The State purchases vast quantities of building materials for both its buildings and its infrastructure projects. Guaranteeing a market for sustainably harvested wood or recycled asphalt would spur investment producing these materials, thus helping to achieve both environmental and economic vitality. At this point on the road to the Beyond Waste Vision, the procurement guidelines would need to focus on materials that are believed to be environmentally preferable. Once regional criteria for green building materials are developed (see Action 12 below), these guidelines should be altered as necessary to specify materials that meet the green criteria. This action would address the resistance to change, design of materials, availability of materials, and limited markets barriers, and potentially the cost barrier.

6. **Build support for green building goals.** To maximize success of the Beyond Waste Plan, a wide variety of stakeholders must be aware of and buy into all of the Beyond Waste goals for green building, including making the practices mainstream, maximizing reuse and recycling, and transforming the design of buildings and materials. The State must work closely with local governments, industry associations, recyclers, building material manufacturers, developers, and other stakeholders to be sure they understand and are working toward the Beyond Waste Vision for green building. In fact, most of the actions in this Action Plan will require active involvement of these stakeholders to be successful. This action will help to overcome the learning curve, lack of awareness, and resistance to change barriers.

ACHIEVE MAXIMUM REUSE & RECYCLING

Washington State's diverts approximately 50 percent of its construction and demolition debris from disposal. Much remains to be done to increase the percentage of construction and demolition debris that is reused or recycled. In particular, large volumes of construction and demolition debris are down-cycled, or put to new uses that provide lower value. For example, wood waste often is burned as hog fuel rather than recycled into finger-jointed studs or roof trusses. The goal of the actions below is to lay the groundwork for improving the reuse and recycling infrastructure so that the recycling rate increases from 50 to 60 percent in three years, and down-cycling decreases.

7. **Support the deconstruction industry.** The deconstruction industry is a vital component of the Beyond Waste Vision for green building, because it provides the opportunity for reuse of building materials. However, the industry is in its infancy in Washington State. This action calls upon the State to foster the growth of this industry, perhaps through grants, funding of pilot projects, training of deconstruction crews, or contracting for deconstruction services directly when State buildings must be replaced or renovated. This action would address the availability of materials and recycling infrastructure barriers.
8. **Work with local governments to plan for providing adequate capacity to handle reuse and recycling of construction and demolition debris.** The spread of green building practices throughout Washington State will increase the amount of debris that is diverted for reuse and recycling. To prevent frustration among contractors and other economic actor sectors, adequate infrastructure must be available to handle this debris. This action calls upon the State to work with its local government partners to identify places where additional handling capacity is necessary, and to begin to plan to provide it. This action would address the recycling infrastructure, resistance to change, and cost barriers.
9. **Work with the recycling industry to begin to develop processing capacity in rural and underserved areas of the state.** Currently, there are very few facilities in rural areas that process construction and demolition debris so that it can be reused or recycled. This situation presents a significant barrier to increased diversion of debris from rural and underserved construction sites. Therefore, this action calls upon the State to partner with the recycling industry to begin seeking investment in processing capability in rural and underserved areas, particularly for such materials as concrete, gypsum, or wood. This action lays the groundwork for addressing the cost, resistance to change, and recycling infrastructure barriers.

10. **Promote increased reuse and recycling of construction and demolition debris.** Many experts stated that the best way to increase jobsite reuse and recycling was to show contractors that it can be cost-effective, and to provide them with the knowledge they need to institute these practices and train their staff. This action calls for providing this information, perhaps through technical assistance, grants, pilot projects, seminars, or educational materials such as lists of local resources. This action would overcome the lack of awareness, resistance to change, cost, and learning curve barriers.
11. **Promote Northwest businesses that use salvaged or recycled building materials as feedstock for high quality products.** Establishing infrastructure to collect and process construction and demolition debris will be more successful if regional businesses are eager to incorporate these materials into new, high value products. The State should develop a program to identify and promote Northwest businesses that already use salvaged or recycled construction and demolition debris as feedstock, and to persuade additional businesses to do so. This plan could include recognition programs, tax credits, free advertising, or other carrots. This action would help address the limited markets and availability of materials barriers.

TRANSFORM DESIGN OF BUILDINGS AND MATERIALS

One of the ultimate goals of the Beyond Waste Vision is to transform the design of both buildings and building materials so that they generate less waste, incorporate no toxics, and are easy to disassemble and recycle at the end of their useful lives. In the immediate timeframe, the State should take steps to lay the groundwork for this transformation, and ensure that its own practices live up to this goal.

12. **Begin working with regional partners to develop criteria for determining whether a building material is green.** One of the major conundrums facing economic actor sectors and critical customers who wish to build green is that there is no definition of what constitutes a green building material. This issue is more complex than it may seem at first glance. Should the definition of green building materials include the amount of energy expended to transport them? Is a product green if it contains recycled content, even if it cannot be disassembled at the end of its life for continued recycling? Criteria to evaluate new building materials would help clarify which materials are green, thus simplifying purchasing decisions and the use of green building standards. Although the State could work to develop its own list of criteria, this action likely would be more effective if undertaken with regional or national partners such as the Cascadia Chapter of the US Green Building Council. This action would help address the lack of awareness, learning curve, and design of materials barriers.
13. **Support the Washington State Department of Natural Resources as it moves toward certification of state forests.** The Forest Stewardship Council has developed criteria for sustainable timber harvests. Aligning harvest practices in state forests with these criteria would provide a local source of sustainable lumber, and allow the State to lead by example. This action also is “ripe”—the Washington State Department of Natural Resources already is exploring certification options for its forests. Successful adoption of sustainable forestry practices should build momentum for the State to expand its sustainable harvest

policies to other natural capital as well, such as sand and gravel resources. If successful, this action would address the design of materials and availability of materials barriers, and potentially the lack of awareness, resistance to change, and cost barriers.

14. **Persuade the USGBC to expand LEED™ so that it more directly addresses toxic building materials.** Currently, the LEED™ standards discourage the use of paints, adhesives, carpet, and other building components that adversely affect indoor air quality, but do not directly address the topic of toxic substances in building materials. The State should work at the regional or national level with the members of the USGBC to deepen the environmental protections in the LEED™ standards such that they discourage or prohibit the use of toxic building materials. This action would take advantage of the design leverage point and the momentum behind the LEED™ standards, as well as work to overcome the design of materials barrier.
15. **Intensify efforts to work with regional and national partners on a product stewardship program for building materials.** Product stewardship programs encourage building materials manufacturers to take responsibility for the end-of-life management of their products. These programs provide incentives to manufacturers to design products that contain no toxics and are easy to reuse or recycle. Although state programs would be effective, the ideal product stewardship program would be national in scope. This action calls upon the State to work with its regional and national partners to begin building a coalition that can partner effectively with manufacturers to develop a regional or national product stewardship program for building materials. This action would act upon the design leverage point, and in turn, help overcome the design of materials barrier.
16. **Educate architects and contractors about green building materials.** This action calls upon the State to design and conduct effective education programs for architects and contractors that alert them to and help them navigate the sea of green building materials. The ultimate aim of this education program is to encourage architects and contractors to incorporate green building materials into their business practices. This action would operate upon the design leverage point, and help to overcome the lack of awareness and resistance to change barriers.
17. **Educate architects about designing buildings for less waste and for deconstruction.** This action calls upon the State to design effective education programs to engage architects in developing building designs that generate less waste and are easy to take apart. Like the education program above, the ultimate goal of this education program is for architects to incorporate designs for less waste and for deconstruction into their everyday practices. This action would operate upon the design leverage point and help to overcome the lack of awareness, resistance to change, learning curve, and design of buildings barriers.

EVALUATION

In the immediate timeframe, evaluation should focus upon establishing a baseline, or benchmark, against which future progress can be measured. Without such a baseline,

communicating progress to stakeholders, potential funding agencies, and other partners will be extremely difficult.

18. **Establish a baseline.** This step is critical to measuring progress toward the Beyond Waste Vision. The State should select indicators that over time will provide insight into the transformation from the present, where green building is unusual, to a future where buildings are built green as a matter of course. Examples of potential indicators include the percentage of building materials by volume that contain toxic substances, or the number of buildings that are constructed (not necessarily certified) to LEED™ or Built Green™ standards. Beyond Waste Consultant Team Issue Paper 7, *Improving Waste and Materials Tracking in Washington*, also contains a table with some suggested indicators for tracking the spread of green building practices throughout Washington State.
19. **Assess the extent to which LEED™ and Built Green™ standards are helping Washington move toward the Beyond Waste Vision.** These two standards are extraordinarily popular programs that are helping to increase awareness and acceptance of green building practices. As such, they seem to be effective trends for the State to encourage. However, it is imperative that the State periodically evaluate whether these standards remain consistent with the Beyond Waste Vision, and go far enough toward the Beyond Waste Vision. At some point, the State may need to create a new standard to effect the transformation that is Beyond Waste.

NEAR-TERM ACTIONS (3-10 YEARS)

These actions focus upon strengthening the capacity of the building industry to provide green buildings, continuing the good work begun in the Immediate Actions, and tackling more complex issues. These strategies seek to raise the bar continuously through incremental changes that prepare the building industry for wholesale transformation.

MAKE GREEN BUILDING PRACTICES MAINSTREAM

In the three-to-ten-year timeframe, Ecology should act aggressively to increase the market share of green buildings to 50 percent of new housing starts and commercial construction, and 50 percent of residential and commercial renovations statewide. These goals are ambitious, but are fundamental to moving consistently toward the Beyond Waste Vision.

20. **Adopt LEED™ standards for all state renovation projects.** This action provides the State an opportunity to lead by example. The State should require all new renovations of its buildings to conform to LEED™ standards, preferably at least at the Silver level. This action would build capacity within the remodeling industry and raise awareness among property managers, other commercial/institutional property owners, and homeowners about the availability of green building practices and programs for renovations. It would work to overcome the lack of awareness, resistance to change, learning curve, and design of buildings barriers.
21. **Attract investment in green buildings through a tax credit program.** Developers and builders often are reluctant to try green building because it can cost more upfront, and the operations and maintenance savings accrue to

building owners, not the builders. A tax credit program that reduces developers' sales taxes or B&O taxes should convince a number of them to try green building. This action would work to overcome the cost, resistance to change, learning curve, and lack of awareness barriers.

22. **Encourage high-density development within urban growth boundaries.** Under the Washington Growth Management Act, local governments have defined urban growth boundaries. The State should work with its local government partners to establish regulatory and incentive programs to encourage developers and builders to choose to build green buildings within urban growth boundaries. Because land within urban growth boundaries often is more expensive than land outside the boundaries, tax credits or other financial incentives may be particularly effective at encouraging this type of development. This action would help to address the cost barrier.
23. **Work with the building industry and permitting agencies to identify ways to streamline the permitting process for green buildings.** Currently, the permitting process is a hassle for builders. A multitude of permits are required, and occasionally the use of new green building techniques can stump permitting officials and make obtaining permits even more difficult. This action calls upon the State to work with the building industry and permitting agencies to find ways to truly streamline the permitting process for green buildings that would be real incentives to builders while preserving the protective intent of the permitting regulations. It would overcome the resistance to change and codes and specifications barriers.
24. **Remove regulatory barriers and disincentives to green building.** Experts interviewed for this study often expressed frustration at building codes that do not accommodate green building practices. Some cited other regulations, such as stormwater management regulations, that also do not accommodate alternative solutions such as rain barrels. This action calls for review of the State Building Code and other state regulations to identify provisions that prohibit – or seem to prohibit – green building practices, and to work with the appropriate agencies to rectify them. Ideally, the new provisions should encourage, rather than simply accommodate, green building practices. This action would smooth the path to widespread adoption of green building practices, and work to overcome the codes and specifications barrier.
25. **Continue to market Built Green™ and LEED™ programs and to provide implementation assistance.** The State should continue and expand its promotion of the statewide Built Green™ program, the availability of LEED™ standards, and other green building resources. This promotion should be targeted toward increasing the number of developers, homeowners, and commercial/institutional property owners that build and demand green buildings.
26. **Begin incorporating green building practices into the State Building Code.** By this time, certain green building practices should start becoming mainstream. The State should work with the State Building Code Council to incorporate these practices into the State Building Code, thereby placing them on the same footing as safety measures. This action would help to overcome the codes and specifications barrier.
27. **Work with state universities to ensure green building practices are taught in architectural programs.** Several state universities offer courses in green

building, but this action calls upon the State to ensure that its universities incorporate green building practices into architectural education the same way they teach safety measures. Partnerships with the state universities and industry associations such as the American Institute of Architects are critical to the success of this action. This action would take advantage of the design leverage point, and help to overcome the design of buildings barrier.

ACHIEVE MAXIMUM REUSE & RECYCLING

The State should strive for a 75 percent construction and demolition reuse and recycling rate by the end of ten years, with little to no down-cycling. In addition, the State should ensure that 50 percent of unwanted buildings are deconstructed rather than demolished. Achieving these goals will require aggressive action and continued investment in infrastructure.

28. **Attract investment in processing facilities in rural and underserved areas.**
By this point, the State's work with the recycling industry to identify opportunities for increasing processing capabilities in rural areas should bear fruit. In this time period, the State and its partners should capitalize on this success and secure investment in processing facilities in rural and underserved areas. By the end of ten years, these facilities should be operating, and addressing the lack of infrastructure, cost, and resistance to change barriers.
29. **Foster expansion of debris collection and transport capability.** Similarly, the State's work with local jurisdictions to identify opportunities to expand handling capability should be paying off. The State should build upon this success by fostering local governments' ability to provide these services, which could take the form of expanded or additional transfer stations, through grants, technical assistance, or other help.
30. **Phase out disposal of construction and demolition debris in MSW landfills.**
Once additional handling and processing capacity is available throughout the state, disposal of construction of construction and demolition debris in MSW landfills should be phased out. To maximize success, the ban should be publicized far in advance to give recyclers, processors, and the building industry time to adjust their services. This action would address the lack of awareness and cost barriers.
31. **Revise local solid waste planning guidelines to require reuse and recycling of construction and demolition waste.** This action takes advantage of a prime leverage point – the legal arrangement wherein Ecology reviews and approves local solid waste management plans. Building upon its existing relationships with local governments, Ecology should communicate the Beyond Waste Vision to local governments and work with them to ensure that revised solid waste management plans reflect this vision. Improved recycling and reuse opportunities could range from enhancing handling capacity to adopting LEED™ standards locally to funding a pilot deconstruction project, among others. This action would help to overcome the lack of awareness, resistance to change, learning curve, cost, and recycling infrastructure barriers.
32. **Require deconstruction of unwanted State buildings and infrastructure.**
The deconstruction industry offers a ripe opportunity to increase reuse of building

- materials. In order to achieve the goal of 50 percent market share for the deconstruction industry in ten years, the State must act aggressively to encourage this industry. This action takes advantage of the State's purchasing power to create a strong market for deconstruction services. Ecology should work with other state agencies to persuade the Legislature to enact such requirements. This action would help to overcome the lack of recycling infrastructure, codes and specifications, and limited markets barriers.
33. **Continue to support the deconstruction industry.** In addition to adopting deconstruction practices itself, the State must pursue other actions to ensure this industry takes hold statewide, including rural and underserved areas. The State could work through established procedures such as the local solid waste management planning process, or earmark a percentage of CPG grants to help promote the deconstruction industry. This action would help to overcome the lack of recycling infrastructure barrier.
 34. **Continue to promote regional businesses that use salvaged or recycled building materials as feedstock for high quality products.** Building on the momentum established in the zero-to-three-year timeframe, the State should continue to implement its plan to promote existing and attract new businesses that incorporate construction and demolition debris into new, high-value products. At this point along the road to Beyond Waste, the State should consider innovative ideas, such as shifting the tax burden to promote the use of salvaged and recycled building materials. This action would help overcome the lack of markets, cost, and resistance to change barriers, and operate on the design leverage point.

TRANSFORM DESIGN OF BUILDINGS & MATERIALS

The three-to-ten-year time period should be one of focused effort upon working regionally and nationally as well as locally to complete the fundamental transformation of the way buildings and building materials are designed. The State's actions during this time should position the building and material design industry to adopt wholesale the principles of green design. At the conclusion of this time period, 50 percent of new buildings in Washington should follow these principles, as should 50 percent of the building materials produced in Washington. Nationally, momentum should be building toward a complete adoption of these design principles.

35. **Work with regional partners to provide testing of green building materials.** The building industry is risk-averse, and understandably so: they are liable for the safety of their buildings. As a result, they are reluctant to use new building materials that haven't been tried and tested. This action calls upon the State to work with regional partners to fund testing of new green building materials, to provide the information that builders need to incorporate the materials into their businesses. This action would overcome the learning curve, resistance to change, and lack of awareness barriers, and operates upon the design leverage point.
36. **Work with regional partners to encourage manufacturing of building materials that stay within the organics or technical nutrient cycles.** Technical nutrients are materials such as glass, metal, or plastic that remain in a closed-loop cycle of manufacturing, reuse, and recovery, and retain their value

- through many product cycles. Like the product stewardship action, this action calls upon the State to work regionally with its partners to encourage manufacturers to create building materials that are composed either of technical nutrients or of organic materials, so that they are simple to recycle into high-value uses at the end of their useful lives. This action takes advantage of the design leverage point and works to overcome the design of materials barrier.
37. **Attract manufacturers of green building materials to the Northwest.** This action highlights the synergy of environmental and economic goals embodied in the Beyond Waste Vision. The State should work to attract producers of green building materials to the Northwest, thus ensuring a local supply of green building materials and providing family-wage jobs and a boost to the economy. This action would help to overcome the availability of materials and design of materials barriers.
 38. **Work with owners of private timberlands to increase the percentage of sustainably managed forests in Washington State.** One of the Immediate Actions calls upon the State to manage its own forests sustainably. This action builds upon the success of that effort, and entreats the State to provide technical or other assistance to private landowners to encourage them to adopt sustainable harvest practices also. As the State builds momentum with forest landowners, it should parlay this success and experience into partnerships with private owners of other natural resources, such as sand and gravel pits, to encourage them adopt sustainable practices as well. This action would help to overcome the availability of materials barrier.
 39. **Reward green design practices.** The design phase is the most effective place to incorporate green building techniques. Therefore, the State should develop a program to reward and encourage green design practices. This program could include recognition programs, tax credits, grants, technical assistance, or free or reduced-cost advertising. The State should consider working with industry associations such as the American Institute of Architects to determine what incentives would be most compelling to architects. This action would target the design leverage point, and work to overcome the design of buildings barrier.

EVALUATION

In the near-term, evaluation of progress should take a critical look at which programs are effective at advancing the Beyond Waste Vision, including the LEED™ and Built Green™ programs. Evaluation could occur multiple times in this period, such as at five years and at ten years.

40. **Use indicators to measure progress toward the Beyond Waste goal.** This action builds upon the good work done in Action 18. Using at least those indicators measured when the baseline was established, measure progress toward the Beyond Waste Vision in the intervening years. This information will be an invaluable communication tool, and should help determine which programs are effective and which are not. New indicators may be necessary to evaluate individual programs. For example, the State should consider comparing the environmental benefits gained from new development and redevelopment inside urban growth boundaries with the environmental damage caused by development outside the boundaries. This information would bolster the State's efforts to encourage development inside the boundaries.

41. **Evaluate whether LEED™ and Built Green™ programs continue to meet Washington’s needs.** The LEED™ and Built Green™ programs are trends in a positive direction that the State can ride toward Beyond Waste. However, at some point, the State may find that achieving the Beyond Waste Vision requires moving beyond the standards. At least once during the near-term period, the State should evaluate whether these standards are continuing to push Washington State toward Beyond Waste, or whether it is necessary to develop a new tool – or if one is already emerging.
42. **Ensure State procurement standards keep up with new materials & technologies.** The green building marketplace is vibrant: new building materials, technologies, and practices emerge with robust frequency. At least once during the near-term period, the State should review its procurement practices to ensure that they are consistent with the state of the art, and update them if necessary.

LONG-TERM ACTIONS (10-30 YEARS)

The State and its partners should start to see the fruits of their labors by this time period. However, as a result of these efforts and the dynamism of the building industry, the building industry may change in ways that are difficult to predict today. As a result, the actions described below are not as specific as some of those outlined for the immediate and near-term. The goals, however, are clear-cut: in order to achieve the Beyond Waste Vision in 30 years, nearly 100 percent of buildings and building materials must be green, toxics must be eliminated from building materials or safely and effectively recaptured, and nearly 100 percent of construction and demolition debris must be prevented, reused, or recycled. In other words, at the end of thirty years, green building practices, materials, and design must be mainstream. Aggressive action will be necessary to achieve these goals and make green building practices the norm. Actions in this timeframe focus on evaluating progress and taking stock of the building industry to ensure that programs build upon positive trends and counteract negative ones.

MAKE GREEN BUILDING PRACTICES MAINSTREAM

As described above, the goal in this timeframe is to ensure that nearly 100 percent of buildings are green. Green building practices must be the norm, rather than the exception, and as natural to architects as safety features.

43. **Work with the USGBC to ensure that LEED™ standards continue to accommodate and incorporate new technologies and practices.** The evaluation described in Action 41 should illustrate the ways in which the LEED™ standards continue to serve the Beyond Waste Vision, and the areas in which the standards must be improved in order to keep pushing the building industry farther down the road to Beyond Waste. This action calls upon the State to work with the USGBC to make any necessary improvements to the standards. However, if the evaluation in Action 41 finds that another tool is more effective at this time, then the State should work to pursue that tool instead of or in addition to the LEED™ standards. This action would operate upon the design leverage point,

and would work to overcome the lack of awareness and resistance to change barriers.

44. **Ensure that the State Building Code reflects the highest green building standards of the time.** By this time, the building industry should be fully capable of incorporating green building practices into their daily activities. Therefore, the State should work with the Washington State Building Code Council to ensure that the State Building Code requires the use of state-of-the-art green design and green building practices. The State should work with the building industry and the Code Council to ensure that the codes are written as effectively and efficiently as possible. This action would address the design leverage point, and work to overcome the lack of awareness, codes and specifications, and resistance to change barriers.
45. **Continue to market green building programs and to provide implementation assistance.** If the evaluation in Action 40 shows these marketing programs to be effective, then the State should continue to make consumers, architects, contractors, developers, and other economic actor sectors and critical customers aware of the LEED™ and Built Green™ green building programs. The ultimate aim of this marketing is to continue to increase demand for green buildings and the environmental, social, and economic benefits they provide. This action acts upon the demand leverage point, and works to overcome the lack of awareness and resistance to change barriers.

ACHIEVE MAXIMUM REUSE & RECYCLING

As with green building practices, by the end of thirty years, reusing and recycling construction and demolition debris must be part of normal business practices. In fact, by the end of thirty years, the very term “construction and demolition debris” should either be obsolete or at least be changed to “construction and *deconstruction* debris.”

46. **Fill infrastructure gaps.** By the end of ten years, all necessary handling and processing capacity should be in place around the state. However, the State should examine the reuse and recycling infrastructure to ensure that indeed there is enough capacity, and work to fill any gaps. This action would address the lack of recycling infrastructure barrier.
47. **At the regional and national level, support development of new technologies to improve reuse and recycling.** It is important to remember that while the State is working to promote the Beyond Waste Vision in Washington, the recycling industry will be working to develop new technologies that speed reuse and recycling. This action calls for the State to contribute to – or lead – efforts at the regional or national level to foster this innovation. This action would help to address the lack of recycling infrastructure barrier.

TRANSFORM DESIGN OF BUILDINGS & MATERIALS

The State’s goal must be to ensure that nearly 100 percent of buildings and building materials are designed for the environment after thirty years. Many of the State’s earlier actions, such as working toward a national product stewardship program, should be showing results by the beginning of this time period. During this time period, the State should capitalize upon these successes, remain alert to opportunities to continue to advance the design of buildings and materials toward Beyond Waste, and act aggressively when necessary to achieve its goals.

48. **At the regional or national level, support development of new green building practices and new technologies that allow creation of green, non-toxic building materials.** Like Action 47, this action calls upon the State to contribute to or lead regional efforts to develop new green building practices or technologies that enable design of new green building materials. The building industry also should be active in these pursuits, so creative partnerships will enhance the effectiveness of both parties. This action would address the design leverage point, and address the design of buildings and design of materials barriers.
49. **Continue testing of green building materials.** The State should continue to work with its partners to provide tests of green building materials, which by this point should be emerging at a rapid pace. This action would help to overcome the resistance to change and codes and specifications barriers.
50. **Continue educating architects and contractors about new practices and materials.** Green building practices and materials are likely to continue to proliferate, likely at a bewildering rate. The State can help facilitate the acceptance of new practices and materials by making information about them readily available to architects and contractors. By the close of the near-term period, the State should have established itself as a premier resource on green building practices and materials; this action would build upon that success. It also would help to overcome the lack of awareness, resistance to change, and learning curve barriers.
51. **Continue to promote and encourage Northwest businesses that produce green building materials and/or incorporate salvaged or recycled construction debris into new, high-value products.** The State should continue its successful programs to attract businesses to Washington State that will manufacture green building materials, and to promote businesses that incorporate construction and deconstruction debris into new products. These efforts will help to overcome the design of materials and availability of materials barriers while diversifying and strengthening the Northwest economy.

EVALUATION

In this long-term timeframe, evaluation will continue to be a critical piece of achieving the Beyond Waste Vision. The State will need to measure – and publicize – its progress towards its goals, and be ready and willing to make course corrections if necessary. Without evaluation, measuring progress and making effective and efficient changes will not be possible. Continued evaluation will allow the State to follow trends, capitalize on momentum, and act upon emerging leverage points.

Measure progress toward the Beyond Waste goal. This action is at once simple and complex. The State should continue to use the indicators developed at the outset of this Action Plan, and to measure new ones where necessary to capture the changes in the building industry. The State should use this information to identify new trends, and develop programs to foster beneficial ones and counteract detrimental ones.

The matrix below provides a summary of this action plan.

Table 7: Summary of Green Building Action Plan

	<i>Immediate Actions</i>	<i>Near-Term Actions</i>	<i>Long-Term Actions</i>
Make Green Building Practices Mainstream	<ul style="list-style-type: none"> • Adopt LEED™ standards for all State buildings • Create a State-wide Built Green™ program • Market green building programs • Ensure State procurement guidelines require the purchase of green building materials 	<ul style="list-style-type: none"> • Adopt LEED™ standards for all state renovation projects. • Attract investment in green buildings through a tax credit program. • Work with the building industry and permitting agencies to identify ways to streamline the permitting process for green buildings. • Remove regulatory barriers and disincentives to green building. • Continue to market Built Green™ and LEED™ programs. 	<ul style="list-style-type: none"> • Work with the USGBC to ensure that LEED™ standards continue to accommodate and incorporate new technologies and practices. • Embed green building practices in the State Building Code. • Work with state universities to ensure green building practices are taught in architectural programs. • Continue to market green building programs.
Achieve Maximum Reuse and Recycling	<ul style="list-style-type: none"> • Foster the deconstruction industry • Work with local governments to plan for providing adequate capacity to handle reuse and recycling of construction and demolition debris. • Work with the recycling industry to begin to develop processing capacity in 	<ul style="list-style-type: none"> • Attract investment in processing facilities in eastern Washington. • Foster expansion of debris handling capability. • Phase out disposal of construction and demolition debris in MSW landfills. • Work with local governments to improve reuse and recycling opportunities 	<ul style="list-style-type: none"> • Fill infrastructure gaps. • At the national level, support development of new technologies to improve reuse and recycling. •

	<p>eastern Washington.</p> <ul style="list-style-type: none"> Promote increased reuse and recycling of construction and demolition debris among contractors. 	<p>through the solid waste comprehensive planning process.</p> <ul style="list-style-type: none"> Continue to foster the deconstruction industry. 	
<p>Transform Design of Buildings and Materials</p>	<ul style="list-style-type: none"> Begin working with national partners to develop criteria for determining whether a building material is green. Support the Washington State Department of Natural Resources as it moves toward certification of state forests. 	<ul style="list-style-type: none"> Persuade the USGBC to expand LEED™ so that it addresses toxic building materials. Begin working with national partners on a product stewardship program for building materials. Work with national partners to provide testing of green building materials. Work with national partners to encourage manufacturing of building materials that stay within the organics or technical nutrient cycles. Educate architects and contractors about green building materials. Educate architects about designing buildings for less waste and for deconstruction. Work with owners of private timberlands to increase the 	<ul style="list-style-type: none"> At the national level, support development of new green building practices and new technologies that allow creation of green building materials. Continue testing of green building materials if necessary. Continue educating architects and contractors about new practices and materials.

		percentage of sustainably managed forests in Washington State.	
Evaluate	<ul style="list-style-type: none"> Establish a baseline. Assess the extent to which LEED™ and Built Green™ standards are helping Washington move toward the Beyond Waste Vision. 	<ul style="list-style-type: none"> Use indicators to measure progress toward the Beyond Waste goal. Evaluate whether LEED™ and Built Green™ programs continue to meet Washington's needs. Ensure State procurement standards keep up with new materials & technologies. 	<ul style="list-style-type: none"> Measure progress toward the Beyond Waste goal.

6. Conclusion

The present is an exciting time for the building industry, which stands on the brink of a major transformation. While green building captures only a small portion of the construction, renovation, and demolition market in Washington State currently, momentum is growing for a wholesale shift to green building practices. Washington State has the opportunity to help foster this shift through the tools and strategies presented in this paper. Following the Action Plan outlined in this chapter would allow the State to carve out a meaningful role for itself in the green building world, and accomplish a wide variety of agency goals, including conserving water and energy, protecting air quality, and, of course, reducing waste. The trend in the building industry toward green building represents a ripe opportunity for the State to muster its resources into a concerted effort to pave the way for the changes that are occurring organically within the industry, and to work toward the Beyond Waste Vision simultaneously.

Appendix A: List of Experts Interviewed for This Study

Name	Affiliation	Expertise
Lucia Athens	City of Seattle	Local Government
Jack Avery	Sellen Construction	Contractor
Randy Backman	KOP Construction	Contractor
Lynne Barker	City of Seattle	Local Government
Dave Bennink	The RE Store	Deconstruction
Thomas Bristol	Purple Flat Top, Ltd.	Architect & Contractor
Logan Cravens	SERA Architects & President of Cascadia Chapter of US Green Building Council	Architect, Trade Association
Peter Dobrovolny	Seattle City Light	Local Government
Judy Dunn	Washington State University	State Government
Matt Freeman-Gleason	The Environmental Home Center	Materials Supplier
Jeff Fromm	Baugh-Skanska Construction	Contractor
Terry Gillis	Recovery One	Recycler
Terry Goebel	Robert B. Goebel, General Contractor	Contractor
Bert Gregory	Mithun Architects	Architect
Jim Haynes	City of Spokane	Local Government
Jim Kolva	Kolva & Associates	Urban Planner
Theresa Koppang	King County Department of Natural Resources & Parks	Local Government
Marc Loeffler	RETEC	Architect
Sandra Mallory	Environmental Works	Architect

	Architects	
Holly Millar	Spokane Neighborhood Action Project	Non-profit organization (low-income housing)
Thomas Nielsen	Seattle Housing Authority	Architect & Contractor
Paul Olsen	Jones & Jones Architects	Architect
Timothy Ormsby	Northeastern Washington and Northern Idaho Building and Construction Trades Council	Trade Association, Contractor
Peter Orser	Quadrant	Developer
Steven Paget	Urban Environment Institute	Non-profit organization and Architect
Tom Paladino	Paladino & Associates	Architect
Jim Primdahl	Institute for Local Self-Reliance	Deconstruction
Jan Rohila	Building Industry Association of Washington	Trade Association, Remodeler
Jim Wavada	Washington State Department of Ecology	State Government
Ron Wells	Wells & Co Construction	Contractor
Mark Wilson	Construction Waste Management	Recycler